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ELECTRIC RAILWAY JOURNAL

To
reduce overhead
maintenance costs
specify
ANACONDA
Trolley Wire

ANACONDA COPPER
MINING COMPANY

Rolling Mills Department

111 W. Washington St.
Chicago, Ill.



From Ore to Finished Product

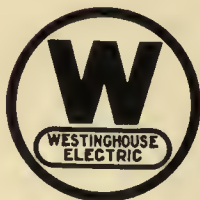
Some Reasons Why You Should Use Westinghouse Repair Parts



When we recommend to railway operators the use of Westinghouse Repair Parts for restoring equipments to their original efficiency, it is with full confidence, because of the great care taken in the manufacture of Westinghouse Repair Parts.



When buying Westinghouse Repair Parts you receive parts made with special tools and by special mechanical processes especially developed and perfected by Westinghouse engineering and research specialists.



Westinghouse interests coincide with yours in that you are interested in procuring the best repair parts, and we are interested in making the best repair parts that advanced engineering, skilled workmanship and superior manufacturing facilities can produce.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors

HENRY H. NORRIS, Managing-Editor

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A recently electrified short railroad line in northeastern Oklahoma immediately proves the advantages of electrification. The road gives excellent freight and passenger service to zinc and lead mining communities.....Page 842

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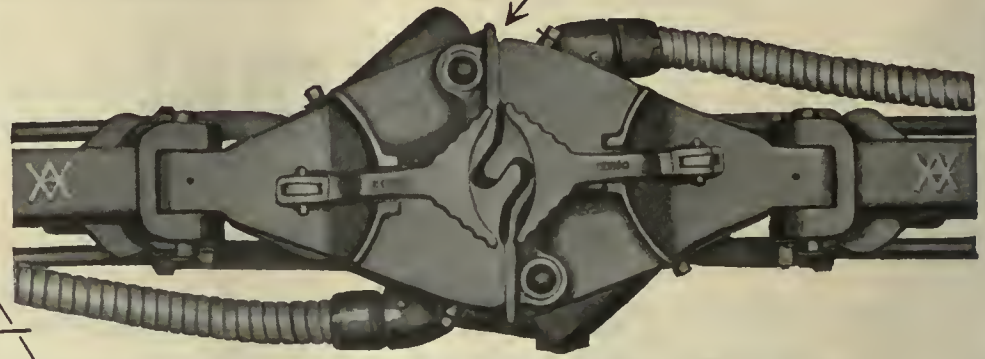
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Circulation of this issue, 6,285



Tight-Lock!

Meaning



Car, Air and Electric Coupler

ABSOLUTE RIGIDITY AT THE POINT OF CONTACT



THE Westinghouse Type K-1-A "Tight Lock" Automatic Car, Air and Electric Coupler is a complete success because it is mechanically correct in construction.

It recognizes that merely to make the various connections is not enough; the connections must be maintained by insuring perfect contact at all points under the severest conditions of strain and stress.

This problem of maintaining perfect connections is solved by the famous "Tight Lock" feature; the greater the strain or tension, the tighter the lock; hence the one outstanding advantage that places Westinghouse couplers foremost in the esteem of traction operators — Absolute Rigidity at the Point of Contact.

The K-1-A is a safety device, a time-saver and an economy. We recommend it for all the lighter forms of multiple-unit operation on surface lines. It is also recommended without the electric portion for motor and trailer service, the advantage of this arrangement being that the electric feature may be added at any time if it is later found expedient to change over to the multiple-unit system.

Westinghouse Traction Brake Company

General Office and Works, Wilmerding, Pa.

"Fourteen Miles East of Pittsburgh"

New York
San Francisco

Washington
Pittsburgh

Chicago
St. Louis



4 Years 340 Companies 4,000 Safeties

That's the Safety Car story today in a nutshell—a wonderful story in the history of a wonderful industry. Of course, a lot of things have helped to make it so.

But it should go without saying that if the *equipment* of the car had not been all that was claimed for it in economy, reliability and *safety*, there would be no such story to tell.

What everybody knows today is that this car made good so quickly because its operating equipment *did* fulfill every claim; and that equipment is the Safety Devices Combination originated and made only by this company in which automatic laborless apparatus, so interlocked, that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the airbrakes and sander applied immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the air brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company

Boatmen's Bank Bldg., St. Louis

Chicago San Francisco New York Washington Pittsburgh

UNION Style "L" Color Light

SIGNALS

Controlled by Continuous

A.C. TRACK CIRCUITS

Make

MAXIMUM OPERATING SPEED

Possible with

ABSOLUTE SAFETY

To the important freight and passenger traffic now moving over the entire 660 miles of the St. Paul's electrified divisions through the Rockies and Cascade Range.



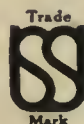
Automatic Color Light Signals on
Electrified Divisions of the Chicago, Milwaukee & St. Paul Rwy.

"Union" Standard Uniform Equipment Throughout



Union Switch & Signal Co.

SWISSVALE, PA.



The Claim Agent Was Right

National Trolley Guard does help out his department

A true story



End view of
National Trolley Guard.
Patented
*It's also made for
double trolley.*

One night while a claim agent for an interurban was riding a car he got a stiff scare and a good hunch.

On a railroad crossing the wheel left the wire and the car was stalled. A heavy freight, traveling fast, was coming and a smash was narrowly averted.

When the claim agent got his breath back he realized what a staggering total might have been charged up to his department. So next morning he told his story and National Trolley Guard was recommended as the remedy.

National Trolley Guard is an inverted trough of open wire mesh which stops the wheel when it leaves the wire and furnishes power to carry the car into the clear.



THE OHIO BRASS COMPANY, Mansfield, Ohio

New York
Pittsburgh
Chicago
Paris, France

Philadelphia
Los Angeles
San Francisco



Trolley Materials, Rail Bonds
Hi-Tension Porc. Insulators
Car Equipment
Third Rail Insulators



*Broadway at Theatre Time, The Great White Way
from the Times Square District.*

The Great White Way that Put New York City on the Map

From all over the world, millions of people flock to New York City to see the "Great White Way," to be a part of it and actually to feel the flash and blaze of millions of glittering and scintillating white lights.

Like bugs around a brilliantly lighted lamp, millions are attracted to this "Great White Way" just as soon as the lights flash on. So persistently do they come that real estate is valued in tens of thousands of dollars per foot with little or none offered at any price.

Think of it. Here is a 300 ft. street (Broadway and Seventh Ave. combined) with a density of traffic so great at night that vehicles are permitted to run in one direction only. One of the widest streets in America, and yet a one way street. And all the result of a "Great White Way."

Think it over. You can put your city on the map with a real "White Way." Where Ornamental Combination Poles with Lamp Brackets are used—carrying also the span wires of the railway—as well as lighting wires—the cost may be divided between the railway company and the light company. Commercial interests find that it pays them good returns—they are willing to share in the cost of securing it—Go after them.

Get after your Chamber of Commerce—Don't let your city get into a rut. Ask us for details.

Electric Railway Equipment Company
Cincinnati, Ohio

30 Church St., New York City



A Plan for Reducing Crossing Maintenance

As practised by Mr. H. M. Steward, Supt. of Maintenance, The Boston Elevated Railway Company. As reported in the March issue of "Electric Traction."

“ON all railroad main-line tracks solid manganese steel crossings, seven inches in depth, are used and are laid on INTERNATIONAL STEEL CROSSING FOUNDATIONS, which are laid on from 10 to 12 inches of broken stone tamped with pneumatic tool. A six-inch concrete paving base is installed and the crossings are paved with granite blocks and grout joints. Anti-rail creepers are installed for a considerable distance on the steam railroad tracks on either side of the crossings to prevent them getting out of line.”

“It is found that if the above type of construction is installed properly the maintenance problem becomes of no moment. Only minor repairs are required during the life of the crossing frogs.”

To assist you in a careful consideration of this method of economizing on crossing maintenance we prepare complete proposal plans showing INTERNATIONAL STEEL CROSSING FOUNDATIONS under your crossings.

WRITE TODAY!

The International Steel Tie Company

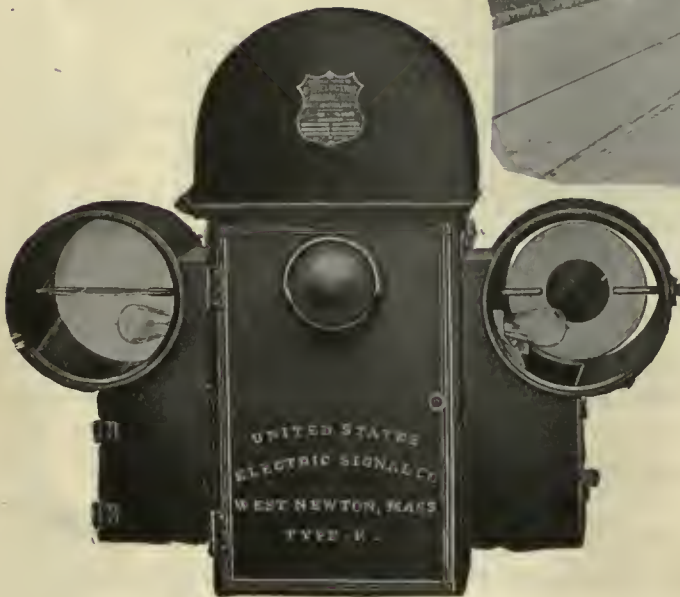
16702 Waterloo Road, Cleveland, Ohio

International Products: Steel Twin Ties; Steel Crossing Foundations; and Steel Paving Guard; are manufactured and sold in Canada by the Sarnia Bridge Company, Ltd., Sarnia, Ont.



Steel Crossing Foundations in C.C.C. & St. L. R.R. Main Line since Dec. 1914.

Steel Twin Tie Track



As essential as the
safety car on your
line today—

U. S. Electric Signals

With the high speed schedules and close headway of the safety car it is imperative that you use Signals.

The Signal best suited to your requirements is the one that is big, reliable and clearly discernible day and night. One so installed that the first car to reach the cut-in contactor will have the right of way.

Those signals are U. S. Electric Signals, that prevent instead of cure.

Backed by a Generation of Signal Specification

United States Electric Signal Company
West Newton, Massachusetts

Representatives:

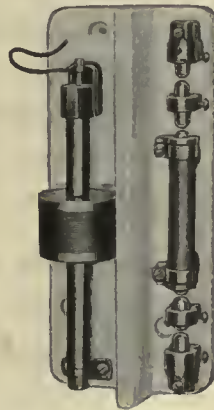
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Services Supply Co., Salford, England



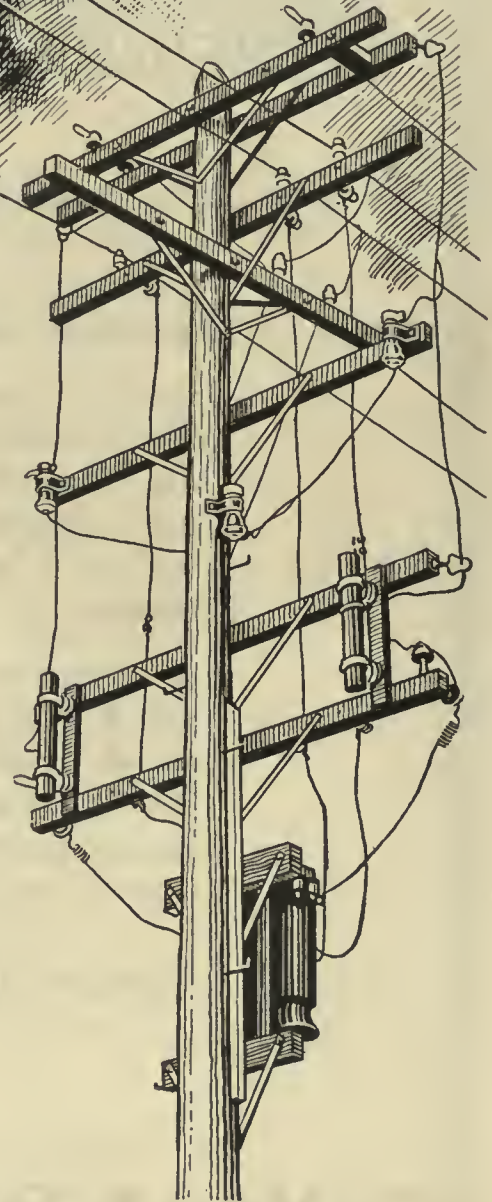
FOR REAL LIGHTNING PROTECTION—USE



Keystone Expulsion Type
Arresters



Garton-Daniels D. C.
Station Arresters



It is economy for you not to risk destruction of your station and line apparatus but to protect it with Garton-Daniels lightning arresters.

For the protection of your transformers the Keystone Expulsion Type Arrester illustrated above is most desirable.

Lightning protection is not expensive—it is cheap insurance against destruction of apparatus, failures in service and loss of revenue.

Buy now—buy from the new Keystone-Garton-Daniels catalog. Have you received your copy?

Sold by Jobbers the World Over

ELECTRIC SERVICE SUPPLIES Co.

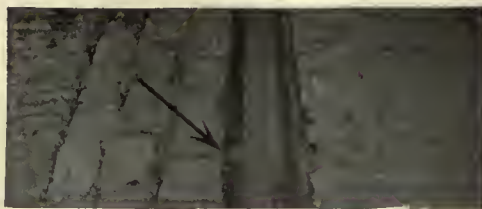
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Branch Offices: Boston, Scranton, Pittsburgh
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto



Thermit Insert Weld installed
in street. No more Joint troubles.

Retrench on your Track Maintenance Expenses *by using* **THERMIT INSERT RAIL WELDS**

The Thermit Insert Rail Weld has now been in service for over 9 years and the welds made originally are as good today as when first installed. They have not cost one cent for maintenance.

Surely a rail weld with a record such as this is worthy of your consideration and we are confident that it will save you a great deal over any type of joint which you may be using at present. It is the final cost that counts and that is where the Thermit Insert Weld "retrenches."

Let us know the section number of the rail which you wish to weld so that we can ship welding material suitable for the purpose. On receipt of an order for material and apparatus, we will send an expert demonstrator to instruct your men so that you can carry on this work yourselves.

Send for our latest Rail Welding Pamphlet No. 3932

Metal & Thermit

120 Broadway



Corporation

New York



Stepping Aboard a Toledo Peter Witt Trailer

Pneumatize! Modernize!

Only Pneumatized Trains Are Efficient Trains

The traffic engineer of one of the eastern Public Service Commissions recently made some congestion studies that are full of meaning to those who have to carry big crowds at short intervals.

On one street, cars were averaging but 5 miles an hour for the first 2 miles; and on another street, only 4 miles an hour for about the first mile.

As the normal schedule speed of the railway is better than 9 miles an hour, you need no slide rule to tell you that the labor cost per car-mile is practically double during these parts of the rush-hour runs.

Just coupling two cars together won't meet such situations. They must be cars which will work together safely, automatically and immediately when the traffic officer gives the "Go Go" or when the closing of the last open door starts the train off on the first point of the control.

To achieve this result, your cars must be pneumatized and automatized throughout, which means:

NATIONAL PNEUMATIC

Door and Step Control	Door and Step Operating Mechanisms
Safety Interlocking Door Control	Multiple Unit Door Control

National Pneumatic Company, Inc.

50 Church Street, New York

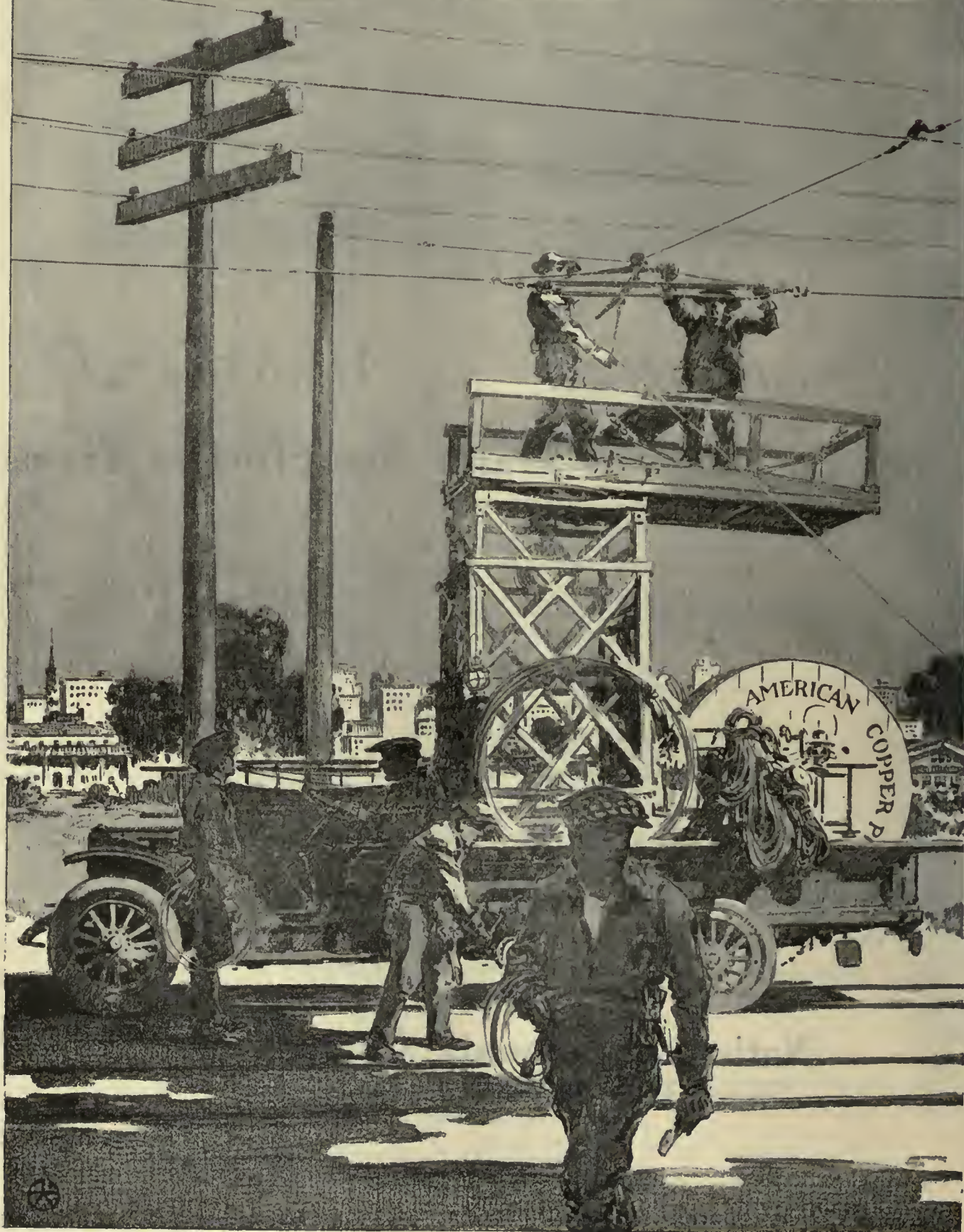
Edison Bldg., Chicago

Works: Rahway, N. J.

Manufactured in Canada by

Dominion Wheel & Foundries, Ltd., Toronto, Ont.

COPPER WIRE and THE



POWER PROGRAM

IN urging electric power companies to buy copper wire *now*, we are thinking primarily of the power program—

First—Of the thousands of building contracts already made, or about to be made, which must soon result in heavy demands for lighting and trolley line extensions.

Second—Of industrial power needs—the hundreds of factories needing light and power.

Third—Of impending hydro-electric development.

Price, however, is an equally important consideration, for in our opinion, copper wire is now selling low. And if, as we firmly believe, recent Court decisions in rate cases, and the growing public sentiment favorable to the utilities, indicate better times ahead for light and power companies, copper wire should now be a sound investment.

* * * * *

Optimistic? Maybe. *But we believe it.*

And the proof of it is that our Bayway, N. J. mills (formerly plant of the Waclark Wire Company) are now "geared up" to meet very heavy demands. Stranded cables, all sizes of bare and weather-proof wires, rods, bus bars, brass and copper sheets, etc., are there produced daily in quantities which in the aggregate represent a greater annual tonnage than that of any other similar plant in the United States. In other words, we are prepared to offer you all the advantages that volume production implies; and, with them, prices which we believe will well repay consideration by electric power interests at this time.

COPPER PRODUCTS

Round Bare Wire
Bare Strand
Trolley Wire—Round and Shaped
Flat and Square Bare Wire
Tinned Wire and Strand
Weather-proof Wire and Strand

Slow-burning Wire and Strand
Bus Bars
Copper in Rolls
Rolled Rods
Drawn Rods—Round, Square and Rectangular

BRASS & BRONZE PRODUCTS

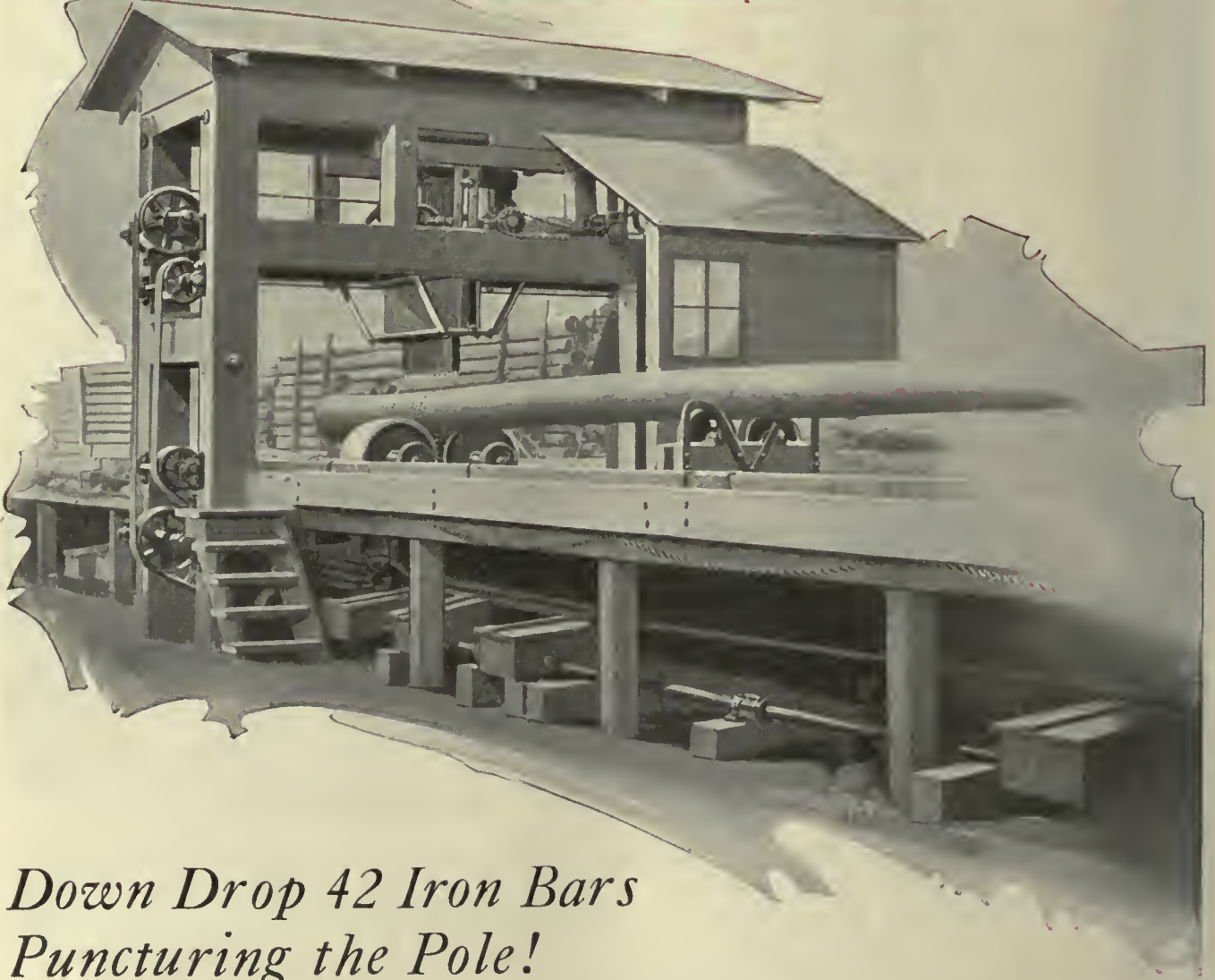
Brass and Bronze Sheets

Brass and Bronze Round Wire
Brass and Bronze Flat and Square Wire

Mills, Bayway, N. J.

AMERICAN COPPER PRODUCTS
CORPORATION
200 BROADWAY NEW YORK

PEN



Down Drop 42 Iron Bars Puncturing the Pole!

This is the wonderful, patented machine with which we puncture Pentrex Poles before treating. The bars are equipped at the bottom end with detachable point holders so that the depth and spacing of the puncture can be regulated.

Each bar works independently of all the others in order to take care of irregularities of the pole. They are raised by cams and drop by gravity. The pole is transported on live rolls and raised into position by hoists. The two large oscillating wheels give plenty of bearing surface.

WESTERN RED CEDAR

PENTREX

THE Pentrex method of puncture-treating marks a long swing forward in the preservation of the poles. It accomplishes a thorough, scientific penetration of preservative at the groundline area.

Out of 375 Western Red Cedar poles in a test made by the Forest Products Laboratory, 93.1% were absolutely sound after 11 years' service. These poles were treated by the ordinary open tank method and were set in Southern California where they were subjected to decay throughout the entire year. In summarizing this test, P. R. Hicks, Engineer in Forest Products, says: "The depth of penetration of the preservative appears to exercise the controlling influence on the durability of butt-treated Western Red Cedar poles."

The poles in this test were treated by the open tank process. By the Pentrex method, the depth of penetration can be accurately gauged and a good saturation obtained. *Think what this means in added life and saving of unnecessary replacement.*

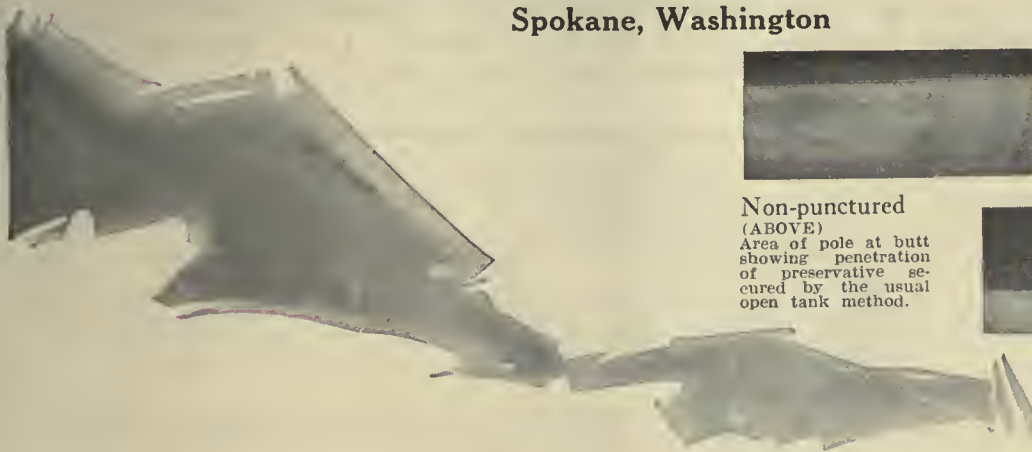
Pentrex poles are manufactured from the finest cedar of the Rocky Mountain District. Both manufacture and treatment are carefully supervised. Every pole is inspected before shipment.

Pentrex poles combine the six fundamental requirements for pole line supports. They're light in weight, low in cost, durable, strong, sightly, safe and adptable.

Write now to the Association or any of our members for further information.

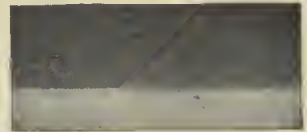
WESTERN RED CEDAR ASSOCIATION

Peyton Building
Spokane, Washington



Pentrex-ed
(BELOW)
Same pole, showing how Pentrex process enables preservative to attain a deep penetration.

Non-punctured
(ABOVE)
Area of pole at butt showing penetration of preservative secured by the usual open tank method.

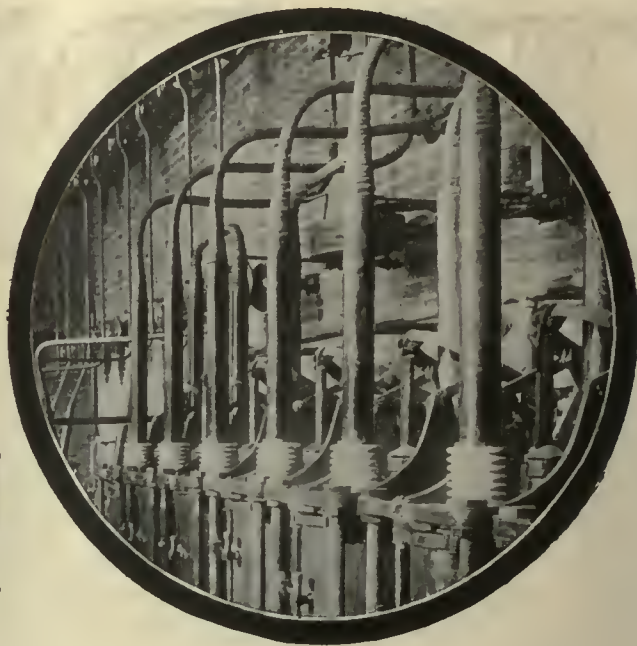


BUTT-TREATED POLES

**Protect
Yourself
Against
Breakdowns!**

IRVINGTON

Black Varnished Cambric



prevents insulation failures because of its high resistance, high dielectric strength, non-hygroscopic qualities, heat resistance and neutrality to chemical action.

Irvington Varnished Cambric is woven from specially selected long fibre cotton.

The fabric is treated in our own bleachery by a special process which gives it a smooth uniform finish, increases its insulation value and mechanical strength.

Uniform coatings of any desired thickness are obtained by treatment in our own specially designed towers.

Irvington Insulation in silk, cotton or paper in punched form, washers, tubing or odd shapes, can be supplied to meet your requirements.

Our increased facilities enable us to make prompt shipments of orders.

Our prices will be of special interest to you.

Largest makers of Varnished Cambric in the world

IRVINGTON PRODUCTS

**Oiled Silk, Varnished Paper, Black and Yellow Varnished Cambric,
Flexible Varnished Tubing, Special Folded Paper for Coil Windings,
Insulating Varnishes, Slot Insulation**



TRADE MARK
Reg. U. S. Pat. Off.

IRVINGTON VARNISH & INSULATOR CO.

Irvington, New Jersey.

Established 1905

Fort Wayne, Van Wert & Lima orders ECONOMY METERS



*Economy Power-Saving
Meters tell you—
without trouble*

1. WHO are your careful, economical motormen.
2. WHICH motormen need instruction in proper handling of car equipment.
3. HOW much power is being saved by motormen collectively and individually, by direct reading units of power.
4. HOW much power is being used on any section of your line.
5. HOW much power is being used in trailer service.
6. HOW much power your freight and express service is using.
7. HOW much power is being used for switching and car movements in yards.
8. WHAT is the line loss on your D.C. distribution.
9. WHEN your schedule speeds are too high or too low.
10. WHAT is the most economical equipment for any service.
11. WHAT are the proper gear ratios for given service conditions.
12. WHEN each car should be inspected.

One of the latest orders for complete installation of Economy Meters, is on the Fort Wayne, Van Wert and Lima Traction Co.'s property, of Lima, Ohio, for their high speed interurban cars.

This is another one of the long list of notable electric railways to adopt the Economy Meter and order *complete equipment*. Economy Meters are now standard on more than 60 roads.

Economy Meters are rugged, time-tried devices

The Economy Meter will get the maximum saving with no hazard to passengers or equipment. It shows how

much energy is consumed per man or per car. The records actually tell a motorman whether he has saved power—and how much.

There is no mystery about Power Saving with Economy Meters

The ECONOMY "Power-Saving" and "Car Inspection" Meter accurately and automatically shows when a car is due for inspection. It shows at a glance how much more work a car can do before inspection is needed. All this is had without any clerical labor.

The records from Economy Meters are of high value for managerial and engineering purposes.

Meter the energy—that's what you want to save

Economy Electric Devices Company

L. E. GOULD, Pres., Old Colony Bldg., Chicago

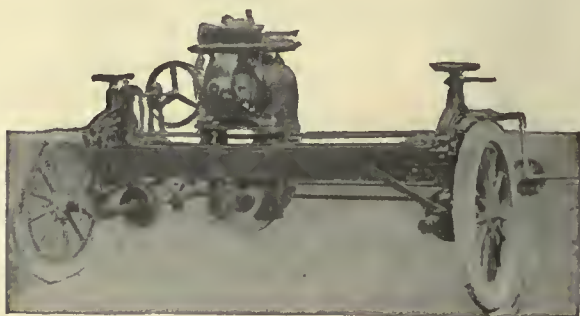
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National Railway Appliance Co., New York
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Grayson Railway Supply Co., St. Louis

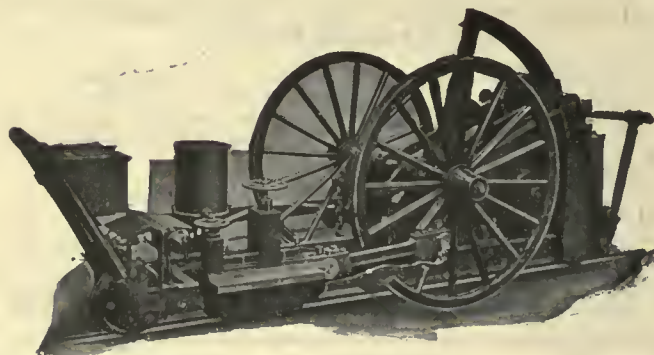
Pre-eminent as Labor and Expense Saving Devices



Universal Rotary Track Grinder



Atlas Rail Grinder



Reciprocating Track Grinder

An editorial in the March 19 issue of this publication said:

"A greater amount of attention was paid last year to the fact that tracks may often be overhauled and put in serviceable condition to cover a period of five years or more at a reasonable cost and without complete reconstruction. The answer to the question, 'When is a track worn out?' has been sought carefully and some surprising results have followed. This paper has recently published several articles describing methods of rehabilitation of apparently wornout tracks and an inspection of some of the jobs described leads to the conclusion that a careful study of the economics of track life on any property will tend to convince engineers of the unwisdom of considering tracks as worn out and needing complete renewal until every angle of investigation and computation has been exhausted.

"The extent to which the arc welder and rail grinder have been used in prolonging the life of tracks and special trackwork has been constantly observed during the past year. These two pieces of apparatus may lay claim, unchallenged, to pre-eminence as labor and expense-saving devices."

All that we have learned about rail grinders and rail grinding before and after welding is freely at the service of any electric railway.

Railway Track-work Company
3132-48 East Thompson St.
Philadelphia

Do Not Let Your Bonding Delay the Traffic



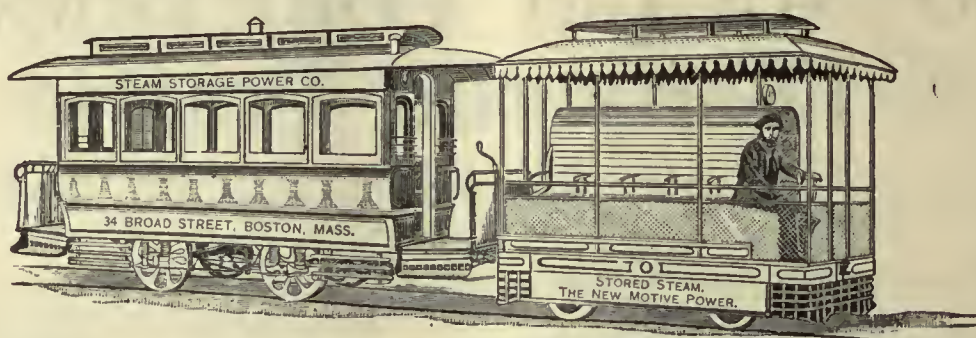
When Erico Welding Equipment is used for installing Erico Arc Weld Bonds it can be placed in any convenient position. A very light trolley pole is the only part that has to be within the gauge line.

As the whole equipment weighs but 100 lbs. it can be handled easily. For transporting distances it may be conveniently carried on the front platform of a passenger car, or it may be provided with wheels for pushing along the track.

It can be used for all kinds of electric arc welding. A crew of two men can maintain an average installation of 100 bonds a day, even with a short headway. A crew of three men will proportionally increase the number of bonds installed in a day.

Write for prices and further information

THE ELECTRIC RAILWAY IMPROVEMENT CO.
CLEVELAND, OHIO



Thirty-two years ago—One of the Exhibits in the 1889 Convention Issue

Every Year For Over a Generation

The Annual Convention Issue of the Electric Railway Journal

has been an important event of the year in this field.

The Convention Issues have annually brought to readers of the *ELECTRIC RAILWAY JOURNAL* a résumé of the year's outstanding thoughts, tendencies and events.

Each issue has carried in its advertising section an exhibit of the latest products of the field's most progressive manufacturers.

The Annual Convention Issue of the *ELECTRIC RAILWAY JOURNAL* is a regular event which the important men of the industry desire, expect and welcome. They read, keep, re-read, and constantly refer to each issue until the next one appears.

The 1921 Convention Issue of the Electric Railway Journal

will appear in connection with the Annual Convention of the American Electric Railway Association, to be held during the week beginning October 2.

The Only Big Exhibit

of electric railway equipment, machinery and supplies this year will be in the Advertising Section of the Electric Railway Journal Convention Issue—for thirty-seven years the industry's consulted, tested and trusted guide in buying.

*Reserve Your
Space NOW*

Electric Railway Journal
Tenth Ave. at 36th Street, New York

Let Specialists Solve Your Lubricating Problem

THERE are two kinds of lubricating service. There are many kinds of lubricants—but there is only one TULC—and this stands for the best of lubricants, service, results, etc.

Some buy oil because it is oil, and do not take into consideration the importance of lubrication.

Others buy scientific lubrication because of the results which will be secured.

A specialist in any line of business gives better satisfaction, and TULC is a specialist in lubrication.

TULC will meet anything used for lubrication and if a test of TULC does not cut down your lubrication troubles, there will be no charge for material sent.

“Overall Specialists”

The service men who work with you on your lubricating problems are not “experts on theories.” They put on overalls and get right down to brass tacks—pack your cars—*show* you how and why Tule should be used. They get results—real money-saving results—99 times out of a hundred. The hundredth time there is no charge for the service.

The Universal Lubricating Co.

Offices: Schofield Bldg.

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Cleveland, Ohio



scientifically and
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reduce lubricating costs

Who's to blame for lax fare collection?

Not the conductor.

He does his best. What with juggling nickels, dimes and pennies, issuing transfers, handling big crowds, helping old ladies and children on and off the cars and a few other things—he's not to blame if he doesn't get 100% fare collection.

Not the superintendent of transportation.

He does *his* best. He tries to pick the right kind of men to handle your money. He lies awake nights worrying about schedules, service, fare collections and a thousand other things. *He's* not to blame if you're not getting maximum fare collection.

Who is to blame?

Well, more than 200 progressive Electric Railway executives have found the answer. They have found that maximum fare collection is secured only when the *method* of such collection is placed on a simple, systematic, business-like basis. Once this is done you have corrected the *cause* of misunderstandings and controversies over uncollected fares. Harmony, at least insofar as the fare collection problem is concerned, prevails between Conductors, Superintendents, Managers and Directors.

The Johnson Fare Box, because it shortens stops, speeds up schedules and practically eliminates the free rider, is the ideal solution of the fare collection problem.

Write to our Engineering Department for *all* the facts.

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Fifty years of specialization in one particular branch of the oil business—*railway lubrication*, has developed Galena Oils to a state of perfection that they are recognized everywhere as the highest grade railway oils possible to manufacture.

But it is not the policy of this company to rest content with the creation of *better lubrication*, hence the development of *better lubrication service*, as exemplified in the master organization of specialists known as the Galena Mechanical Expert Department.

The co-operation offered through the medium of this exclusively Galena Service is daily proving its value on hundreds of railways, by invariably securing results in efficient and economical lubrication that show quickly in improved operation.

Just as the efforts of duplicating Galena Oils have failed through lack of *quality*, so likewise have the attempts to copy Galena Service been made ridiculous by absence of the vital essentials of knowledge and experience.

*When Galena Service Goes In
Lubrication Troubles Go Out*

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An article which increases efficiency, eliminates hazards, and reduces maintenance cost of existing equipment, merits investigation



Line Breaker cover lowered showing relay

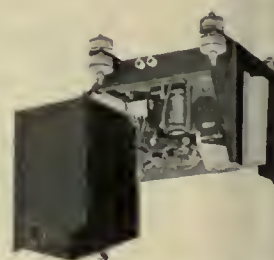
A Line Breaker Under the Car

A drum controller arcs destructively at the contacts when the motorman "notches 'er up" or shuts off. It's because the controller is not merely adjusting speeds, a service for which it is primarily intended, but it is also opening and closing the motor circuit. The G-E line breaker removes from the controller the function of opening and closing the main motor circuit and, through an overload relay, protects the motors against improper acceleration. It replaces the familiar overhead hand-operated breakers, putting the flash and noise down under the car where they can't cause panics or scorch hats.

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G-E line breaker equipments are cutting controller maintenance cost and making car operation more economical on many street railways.

Ask for Bulletin 44678



Cover removed showing contactor



Ratchet switch installed in bottom of controller

General Electric Company

General Office
Schenectady, N.Y.

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Number 19

Rigid Periodical Inspection Should Be Insisted Upon

THE evils of haphazard inspection, of inspection which is not thorough and rigid, was brought forcibly to attention the other day while details of a certain truck were being examined. One of the motor bearings had collapsed and broken and was on its way out of the housing in pieces. It was caught just in the nick of time by the accident that this particular truck, out of a large number, was selected to be removed for the study being made. Most properties, and this one is doubtless no exception, have a regular schedule for inspection, but since inspection is by human beings, mistakes will be made.

In this case, something was overlooked which points to the necessity of equipment superintendents and master mechanics insisting upon not only periodical inspection but rigid and thorough inspection. The mechanical side of the economies and safety of operation of rolling stock is up to the equipment men. Constant inspection to catch every fault before it becomes serious is the basis of this part of the business. This also emphasizes to the executive the value of a well trained engineer in charge of the equipment. He is always worth more than most companies can afford to pay him.

How Some Proposed Taxation Would Affect the Industry

ONE of the questions which the present Congress will have to settle is that relating to future taxation. A repeal of the excess profits tax seems to be generally demanded, partly because of its complexity and partly because, with present business conditions, it is so much less productive than during the hectic years of business ended by 1920. In its place the substitutes principally recommended have been the sales tax, an increase in the normal tax, as levied on corporations or individuals or both, and a modified tax on corporation profits.

Various forms of "sales tax" have been suggested, but a common form, if not the most common form, provides a tax of 1 per cent each time the merchandise is sold, whether in the course of the manufacture of manufactured articles, or in the course of the distribution of merchandise among wholesalers, jobbers and retailers. Thus, in any merchandise which passes through several hands, the tax would be added each time, but some of the advocates of the sales tax have estimated that this cumulative tax would not amount to more than an average of about 3½ per cent on the cost of the article to the ultimate purchaser. It is generally expected also that the tax would not be laid on sales of certificates of ownership, such as stocks, bonds or notes, or on payment for services, either personal or those furnished by utilities, or on sales of real estate.

The discussions on this tax at the recent meeting of the Chamber of Commerce in Atlantic City as well as discussions on the tax elsewhere have disclosed a con-

siderable diversity of opinion on its merits. Generally speaking, the tax has been favored by the financial, manufacturing and retail interests of the country with certain notable exceptions, however, and has been opposed by the agricultural and labor interests, and others who have proposed other taxes in its stead. This, in fact, is the position of Secretary Mellon, whose recommendations made public May 2 include increases in corporation taxes, increased stamp taxes and licenses for the use of automobiles.

As between the excess profits tax and the sales tax, the interest in the matter by electric railway companies so far has been largely academic. Very few electric railway companies have been affected by the excess profits tax, because they had no excess profits, and the nature of their services would exempt them from the sales tax as usually proposed. In fact, it would be impossible for the electric railways to collect from their patrons 1 per cent on a 6-cent or a 10-cent fare, and it is the understood purpose of the sales tax that it should be paid by the consumer.

The effect on electric railway companies of an increase in the normal tax or of an added corporation tax on net profits would depend entirely on the form and extent of the latter tax. The most serious possibility would be any considerable tax on undivided surplus. No matter what one may think of the principle of taxing the undivided surplus of ordinary corporations, such a policy if applied to the utilities would be detrimental, both to them and the public. It is only by the use of this surplus to finance essential improvements that many companies during recent years have been able to serve their growing communities at all adequately. From one point of view such a policy has been hard on the stockholders, but they have had the satisfaction of knowing that their property was continuing to fulfill its public functions and that, in some critical cases, this plan was better than to borrow money for extensions at the very high interest rates which would have to be paid for it during these abnormal times.

Should Periodical Re-examinations of Employees Be Held?

IN THE issue of this paper for Dec. 18, 1920, there was an editorial reference to the necessity for physical and mental examination of prospective employees. This was in connection with a forthcoming report of the committee on personnel of the American Electric Railway Transportation & Traffic Association. Since that time some of the larger electric railway companies have extended the scope of such examinations with results so satisfactory that an "experience meeting" in connection with the next convention should help to impress on the railway representatives the importance of giving more attention to this feature of successful management.

It is an easy matter for a railway company to require all prospective employees to submit to a physical and

mental examination before entering the service. This affords an opportunity to weed out undesirables before they have come under the protection of a workmen's compensation act and without giving them a chance to endanger the lives of passengers. It is an entirely different matter to carry out a policy of re-examination of employees after they have been working for some time. This involves the question of what to do with an old employee who has been found wanting in some serious particular as to physical requirements. Shall he be carried on a pension roll, or transferred to some less hazardous occupation, or summarily dismissed?

Adherence to a high physical standard undoubtedly would be an advantage to the riding public, to the company and to the employee himself. But if in the carrying out of such a policy a workman faces discharge after twenty or thirty years of faithful service, it is worth while to consider what can be done. Few railway companies are sufficiently prosperous to be able to set aside an adequate pension fund for employees. In some cases where the employees are strongly unionized objection has been raised by their representatives to the establishment of a company pension plan. This probably is due to fear that the men would be won over to a company organization. The alternative plan of finding work for the disabled employee in some other department would be all right until all possible jobs were filled. The last alternative of dismissing the workman meets with objections from the humanitarian standpoint, yet it is one which will have to be faced in a serious recognition of the duty owed to the public of furnishing safe men as well as safe equipment. A defective wheel or brake would have to be discarded. What about the defective employee? The subject opens up a broad field for discussion.

Is It Better to Cut Wages in a Lump or By Installments?

THE Boston Elevated Railway employees have fallen in line with those of Cleveland in accepting without strife a decrease in their basic rates of pay. Conditions governing the decrease, which amounts in all to about 10 per cent, call for its being made in installments. For men on the surface lines in service more than one year, in other words for those in this class receiving the maximum pay, the hourly wages will be decreased 2 cents per hour on July 1 and 3 cents per hour additional on Jan. 1, 1922. This corresponds to a total reduction of 7.14 per cent from the present rate of 70 cents. Elevated motormen and guards have reductions of from 4 to 6 cents per hour, also in two installments of six months each.

It is this method of reduction which makes the Boston program of especial interest. Those who favor the plan will doubtless argue that the division of the reduction into two installments more easily permits the employee to adjust his scale of living to his income, hence that the plan is a wise one. Those opposed will probably declare that where a reduction in wages is no more than in the cost of living no adjustment by the employee in his scale of living is necessary. Such changes, they argue, should be definite for a definite time and future periods can very properly be cared for on their merits whenever there is a material change in living costs.

The more general practice of using the immediate settlement plan of adjustment seems to indicate its greater popularity among railway men. But this is not

conclusive, as it is not known that the installment plan was thought of and considered in other cases. It is worth examining.

Another interesting departure in wage agreements is the recent arbitration award in the case of the New York pressmen, handed down this week and accepted by both sides. This award calls for a reduction in wages of about 12 per cent and is made retroactive to April 1. Retroactive wage increases are common and there is no reason against retroactive reductions, but they are not frequent. The men expect to pay back the sum thus awarded by deductions from their payroll during May.

Philadelphia Co-operative Spirit Carries Down as Well as Up

THE present problem of effecting necessary reductions in wages, no matter by what detail it is actually carried out, places a test on the satisfactory nature of the relations of management to men on electric railway properties which is probably as severe as any which has ever been applied to this relationship. There has already been comment in these columns on some cases which have arisen, Cleveland being an outstanding one. Other recent cases are Altoona, Pa.; Albany, Ala.; Hudson, N. Y.; Saginaw, Mich., and Boston, Mass., commented on above. Another case of interest to the industry is Philadelphia, where wages have been determined according to contract with the men by averaging the rates in effect in Buffalo, Cleveland, Detroit and Chicago. The method of computing the Philadelphia wage is of course a mere mechanism and may be open to the criticism of "letting George do it," but it seems to have worked successfully.

The manner in which the men are reported to have accepted this reduction, voluntarily, is an indication, possibly, of their sense of partnership in the enterprise, certainly of the understanding of the necessity for and justness of the decrease. The way was paved for this present reduction, however, last summer when the last increase went into effect. Mr. Mitten warned the men at the time that this was all temporary and that they should consider the increase in income as "velvet" and store it away, not establishing a scale of living based on the new wage, for this was bound to come down soon.

Each property will develop its own relations in this respect largely as the result of the individual characteristics of the men on both sides. Indications are that these relations are improving all over the country, in spite of the strain on them caused by the past several years. Philadelphia's record of ten years of industrial peace, recently celebrated there at the tenth anniversary of the successful co-operative plan on the P. R. T., is one instance to prove this.

Has Paris Solved the "Incentive" Problem in Railway-City Contracts?

IT IS universally admitted that the most pressing problem before both the electric railway and its community today is to find a means of combining an attractive rate of return to the investor with a continued growth in the usefulness of the transportation system. The service-at-cost and public trusteeship plans are steps in that direction, but many of these agreements are thus far on the wrong side of the ledger and on the wrong side of the traffic count. If, then, the

present agreements do not look like the last word on the subject, what can we learn from those who have had longer experience with contracts of that kind?

Fortunately, a most interesting experience in this direction has come to hand through the changes now taking place in the Paris metropolitan district. Here contracts in which fares went up or down according to traffic density were made as early as 1910. However, it seems that they failed the public before the war in producing the expected enlargement and betterment of service and that they failed the company during the war in proving flexible enough to meet the situation in wages and materials, brought about by the war. Then, too, the division of the territory among six companies, although only one dominated Paris proper, was a hindrance to progress.

It is not necessary to set forth here the detail terms of the superseded contracts and the agreement with the new State-backed operating company, as these are presented elsewhere in this issue, but it is pertinent to see what weaknesses were disclosed during the operation of these early agreements. From the public's point of view, the weakness lay in the fact that the company's rate of return depended too closely upon a definite and undesirable density of traffic. Therefore, as a business proposition, the company hesitated to do anything which would impair this density of traffic, whether in extensions of routes or shortening of headways. From the company's point of view, conditions had reached the point where the rate of return was no longer insured by bearable increases in rate of fare. The mere relinquishment of the city's percentage of gross earnings would have been but a drop in the bucket.

The community, which includes the districts contiguous to Paris, therefore found it necessary to devise a plan whereby the profit possibilities of the transportation system would be made secondary to its usefulness. Obviously, private capital could not be expected to run a transportation system on that basis. On the other hand, direct government ownership and operation did not offer any definite guarantee of efficiency. So it comes about that the plan evolved is one which places the capital invested in the leasing company upon the same plane as a government bond and elevates the management and the employees to the position of supreme responsibility for results.

Now what are the results expected? Does the government expect that there shall necessarily be a surplus big enough to meet the cost of operation and all overhead, including the sinking fund payments to amortize the securities of the superseded companies and 6 per cent to the shareholders in the new company? No. The mark of efficiency will be primarily in enlarging the usefulness of the undertaking—in getting more riders; and secondarily in taking advantage of any improvements that will lower costs but not decrease service. The government frankly does

not expect that the most able management will be able to show a surplus for some years to come, but it is determined to make the transportation system as valuable to the community as possible without incurring extravagance. Hence there is seen a system of awards based upon both greater usefulness and technical progressiveness.

In sum, the outstanding features of this contract, in contrast with the usual service-at-cost plan, are that the rate of return will not have to come out of more revenue from less riders at higher fares, usefulness of the mass transportation system being predominant, and that a reward for attaining this enlarged usefulness will go to those whose brain and brawn are most closely responsible for results.

Use Judgment in Welding Reclamation

EVERY one knows of the great importance and value of welding in the reclamation of electric railway equipment. Welding has virtually saved the lives of many companies, both in its ability to keep the wheels turning and more permanently in the fine economies effected. During the war the inability often to get new equipment at any price justified the use of the welder to an extent that would not be considered good practice from the standpoint of either safety or economy in normal times. Times now are perhaps not normal, but conditions have eased sufficiently so that there is no longer any need to carry the reclaiming work to the extremes that were formerly necessary. The master mechanic particularly should check up on the welding work he is having done with two considerations in mind, namely, safety and cost. The more important of these is safety, for even though an economy may be shown it is inadvisable, at least with the present limited knowledge of the art, to weld at vital points such parts as car axles, flanges of wheels used in high-speed service and other parts that are subject to high strain and the failure of which might mean a serious accident.

The principal points of breakage of axles are between the gears and hub and between the journal bearing and hub of the wheel. These points are the vital points of a car axle, and as these parts cannot be increased in

size above normal, because of the necessity for a machined finish at these points, it appears inadvisable to attempt welding repairs at such locations. Until there is more definite knowledge about the molecular effect of welding upon the metal greater caution may well be used.

While one's pride may be flattered by the statement that "we never scrap anything," still it is a very easy matter to be fooled about the relative economy of welding a broken or worn piece of equipment versus the scrapping and replacing it with a new one.

Quotation from the Federal Electric Railways Commission Report

No. 19

THE commission is not pessimistic as to the future. The electric railway problem admits of a satisfactory solution, once the elements that compose it are made known and the principles of ordinary economic and business common sense are applied.

The duty both of the public authorities and of those who control the electric railway enterprises of the country is plainly indicated. The time has come for stable and satisfactory settlements of traction difficulties.

The commission can go no further than to point out the principles upon which readjustment should be based. The task is really that of the state and local authorities upon the one hand and of the companies upon the other. Failure to rehabilitate the industry and the service is possible only if those upon whom the responsibility rests fail to undertake the work or pursue it in a spirit that makes settlement impossible.

The Baby Electric Railroad Is a Buster

Recently Electrified Short Railroad Line in Northeastern Oklahoma Immediately Proves Advantages of Electrification—Gives Excellent Freight and Passenger Service to Zinc and Lead Mining Communities—Contemplates Early Extension to Much Larger System

WHAT is probably the latest member to enter the electric railway field is the Northeastern Oklahoma Railroad Company, located in the northeastern corner of the State of Oklahoma and feeding what is probably the largest lead and zinc field in the world. As was noted three or four months ago in this paper, this railway started electrical operation about the first of February this year. It had previously been a steam road, which had been operating for about eight years, but whose service had been growing more and more unsatisfactory to the mining companies. During the latter part of 1919, in order to purchase the steam railroad property, the Northeast Oklahoma Railroad Company was formed, largely from mine operators and business men in Miami, the principal terminus and location of the main offices of the company. J. F. Robinson, president of the company, is also president of the Commerce Mining & Oil Company, the largest mining group in the Miami field. The road was formerly known as the Oklahoma, Kansas & Missouri Railroad.

The accompanying map gives some indication of the character of the layout of this road. The entire

area shown on this map is practically as flat as a table top and twelve or thirteen years ago was Indian farm land of no particular importance. About 1911 lead and zinc were discovered and developed at and around Commerce, though there were some little developments north of that. It was at this time that the Oklahoma, Kansas & Missouri Railroad was started to handle the traffic from this new mining field to the St. Louis & San Francisco and the Missouri, Oklahoma & Gulf (now the Kansas, Oklahoma & Gulf) Railroads at Miami. During the world war the demand for lead and zinc caused a rapid expansion of this field, until at the close of the war there were some 280 lead and zinc mines operating here. Immediately these mining towns took on a new importance, for these are mining towns in the truest sense and remind one very much of the early days of Leadville, Cripple Creek and other centers of mining activity, busy with the creation of considerable new wealth. Practically all of these mines are located on land whose mineral rights have been leased from Indians, who hold title to the land under government supervision. Some of the Indians had fabulous incomes during 1917, 1918 and 1919, tales of \$20,000 to \$50,000 per month being

not unusual. The writer had the opportunity of going over this interesting territory in March to inspect the railroad and its community. Mining activity has, of course, now ceased in many of these mines and here lie the large groups of frame houses or shacks, practically all one-story in height, making up these mining towns, with populations which are ever variable.

Miami itself has a population of about 8,000 and North Miami of 600. This is rather stable population. If a normal figure can be set on the population of the other towns, it is about as follows: Commerce, 3,500; Tar River, practically a part of Commerce, 4,000; Picher, 10,000; Century, 1,500, and Treece, a town just above the end of the spur which reaches up into Kansas,

3,000. The officials of the road figure on a population of about 45,000 on the line and in the contiguous territory. From this, records show a passenger business of about 75,000 per month.

As this territory grew, the old steam road extended its lines to many of the mines, as did also the Miami Mineral Belt Railroad, which came in from the east to tap the field. This road also has connection with the Frisco and K. O. & G., as shown.



MAIN STREET, MIAMI, SHOWING CATENARY OVERHEAD WITH CONCRETE POLE CONSTRUCTION

The main office of the company and a passenger waiting room are in the large building in the foreground

Miami is a Western town which would surprise most people who have not been to Oklahoma. It has wide streets, 90 per cent of which are paved. It has excellent schools, is the home of one of the state mining schools, has one of the best hospitals in a radius of several hundred miles and is the trading center for a large area with which it is connected by excellent roads made from the chat which is the refuse from the lead and zinc mines. Mountains of this chat, by the way, surround each of the mines and give one the impression that the topography is not so flat after all. This chat, too, forms one of the sources of revenue for the company, for it can be secured and hauled away at very low cost for use in paving and in concrete work. Miami is also the home of a new industry of tripolite products, used for polishing purposes in the metal trade and also for facing casting molds. The great Krupp works in Essen, Germany, are said to secure their tripolite from the Miami field.

As to the road itself, the original equipment consisted of four steam locomotives, six passenger cars, used as trailers on the steam trains originally and retained as emergency trailers, and four General Electric

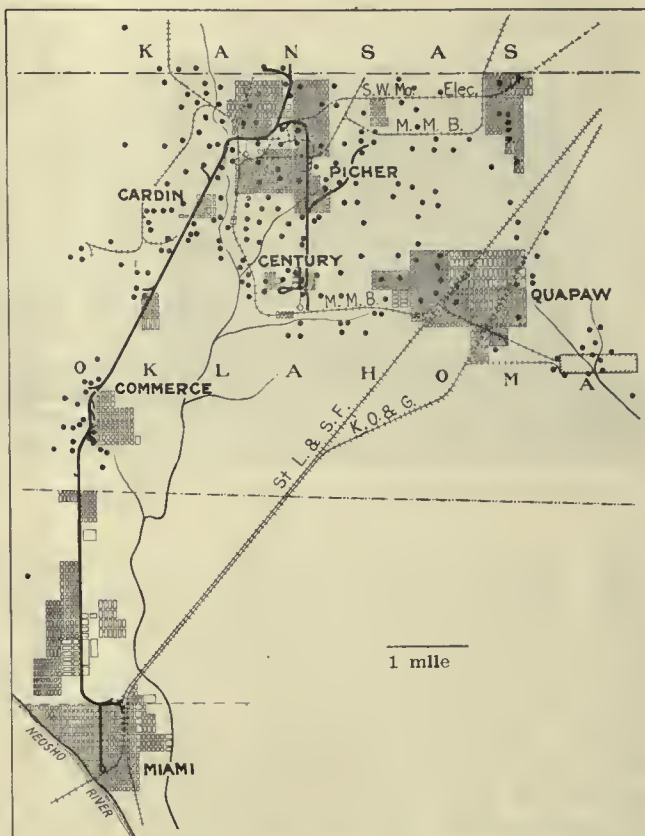
gasoline-electric passenger cars, in addition to freight equipment described later. The steam locomotives are being put into shape to sell, except that one will probably be held to operate work trains in case of making any extensions to the system, as planned, in the next five or six years. The four gasoline-electric passenger cars are also being repaired and overhauled for sale.

The entire system has been overhauled and track regraded and rehabilitated by the new management. The rail is standard 70-lb. rail on red and white oak ties, some of which are treated. The ballast is of the ever-present chat and averages a depth of 12 in. under the tie. The maximum grade in passenger service is 1.26 per cent; in freight, 1.05 per cent; the maximum curvature on the main line is $8\frac{1}{2}$ deg. and in yards 16 deg. All rail joints are bonded with 0000 strand bonds and cross-bonds of the same capacity are placed every thousand feet. The entire line is constructed on private right-of-way varying in width from 150 ft. at stations to 40 ft. at other points to suit conditions.

Necessary sidings, most of which are at least 1,500 ft. long; spurs, wyes, etc., were in the original layout or have been added so that the railroad can adequately take care of all necessary traffic.

The overhead, and all of the electrical work, is naturally new and has been added by the present management. The overhead construction, some illustrations of which are shown herewith, was designed by the Ohio Brass Company and is of the flexible catenary type. It is an example of how to put up overhead. The distribution scheme, with a substation at Picher and with one at Commerce, consists of a 500,000 circ.mil Roebling feeder cable installed the full length of the main line electrification. A 0000 grooved trolley, hard-drawn copper, furnished by the Standard Underground Cable Company, forms the contact wire and is suspended from the catenary by hangers spaced 15 ft. apart. The feeder is attached to the trolley wire every 1,000 ft. and lightning arresters have been placed at this same spacing.

Western red cedar poles have been used, spaced 120 ft. on tangents, and on curves spaced to suit the curvature. These poles have been butt-treated, with hot application and then cold application, both brush applied. All poles are set 6 ft. in the ground, whether 35 ft. or 40 ft. in length. In the city of Miami, in place of wooden poles, reinforced concrete poles have been used both as a feature of artistic appearance and to give necessary strength. The transverse spans on Main Street, shown in one of the accompanying illustrations, are 60 ft. long, and in order to hold the overhead as rigidly as desired are under very heavy strain. The



MAP OF THE NORTHEASTERN OKLAHOMA COMPANY—THE ORE LINE (INDICATED BY HEAVY BLACK LINES)

concrete poles used here are what are known as the 1,500 class furnished by the Massey Reinforced Concrete Products Company. They are 33 ft. long, with a 15-in. butt and 5-in. top, round, and reinforced the entire length with six longitudinal rods and also with annular rings of steel.

A telephone line runs the entire length of the main line of the road. To reduce interference to a minimum, this telephone line has been placed on the inside end of the cross-arm, the feeder being on the outside end; in addition to this, the telephone line is transposed every third pole.

Electrical energy is purchased from the Empire District Electric Company at 33,000 volts, three-phase. In order to have equipment furnished on time, it being found impossible to get satisfactory shipping dates from manufacturers on new equipment, the substation equipment was purchased from the Cincinnati & Columbus Railway. Only one substation is now operating, but the



VIEW SHOWING FREIGHT SIDINGS AND OVERHEAD. NOTE THE HUGE "CHAT" PILE AT THE RIGHT



A TYPICAL MINE, AT PICHER, WITH THE NUMEROUS ONE-STORY MINERS' SHACKS IN THE DISTANCE



OUTSIDE SUBSTATION NUMBER 2—AT PICHER—
NOW OPERATING



INSIDE SUBSTATION NUMBER 1—AT COMMERCE—
NOT YET OPERATING

other will be put on the line very soon. The one operating is located at Picher and contains one 400-kw. G.E. converter, fed from three 145-kw. General Electric transformers. The other substation, located at Commerce, contains two 400-kw. General Electric converters and is being equipped with three 250-kw. new Pittsburgh transformers. The original transformers, from Ohio, had been used at 16,500 volts, and it proved desirable to make a new installation for satisfactory operation at the higher voltage rather than try to use the old transformers.

Both stations are being equipped with Westinghouse electrolytic lightning arresters. Both are equipped with Burke remote-control, high-tension switches.

The rolling stock of the company was likewise purchased from other railways, in order to secure it on time. Two large motor cars for passenger service were purchased from the old Blue Grass Line at Nashville, Tenn. These are equipped with four 100-hp. G.E. 205 motors and are of the interurban high-speed type. Four smaller cars, purchased from the Cincinnati & Columbus Railway at Ohio, are used for lighter traffic. These are equipped with four 50-hp. G.E. 57 motors. The road also has one Westinghouse-Baldwin 50-ton locomotive and the former freight equipment of the steam road, namely, ten gondolas, three flat cars, one ice car, two cabooses. The third caboose inherited from the former management has been converted into a line car. There is also a motorized package freight express

and baggage car which is used for handling small package shipments.

The regular schedule calls for sixty-six passenger trains per day over the line and freight service as demanded. The passenger traffic is largely composed of miners, many of whom commute daily from their homes in Miami to the mine, and also an interchange of miners from the other towns back and forth. The average passenger car-miles per day are something over 850. The exact figures for the month of February were 24,922. Already the officials of the road have some statistics which show the advantage of electrical operation. Measured at the substation, and including station loss, conversion, etc., the watts per car-mile are estimated to be about 3.87 in passenger service. At the present cost of electrical energy, this figures about 7.3 cents per car-mile and about 0.7 cents per passenger-mile. With the former operation of motor cars, the fuel cost alone was about 18 cents per car-mile.

On the freight side February showed 2,088 loaded car-miles and 2,196 empty car-miles handled with a locomotive mileage of 629. On a basis of 40 tons per car dead load, with the weight of the car not included, the cost of coal in January figured \$3.50 per car, whereas the cost of electrical energy for February figured \$1.27 per car.

The passenger traffic is handled on a fare base composed of 5-cent units, with, however, a 10-cent minimum fare. The fares are, figured from Miami: To Com-



TWO VIEWS ON THE RIGHT-OF-WAY SHOWING OVERHEAD CONSTRUCTION ON CURVES AND
GIVING SOME IDEA OF THE NATURE OF THE LINE

merce, 4 miles, 10 cents; to Blue Goose, 7 miles, 15 cents; to Cardin, 8 miles, 20 cents; to Picher, 10 miles, 25 cents, and to Century, 13 miles, the end of the main line electrification, 30 cents. A commutation book, with 100 5-cent coupons, is sold for \$4. Only about 10 per cent of the fares are paid by the use of these coupons, however.

The business of this road, as seen, depends almost entirely upon the activity of the lead and zinc industry, and particularly of the Miami field which this road feeds. Traffic in the latter part of 1920 and the early part of 1921, for instance, is considerably off from what could be considered normal. Of course, it is probably never expected that the war-time conditions of two twelve-hour shifts of seven days in the week will reappear. Road building should give some impetus, however, to traffic in this field on account of a possible demand for chat.

More than 4,000 carloads of this chat were shipped over the lines of the Northeastern Oklahoma Railroad alone during 1920.

But there are opportunities for diversifying the business of this railroad near at hand. Some 150,000 acres of coal land lie southwest of Miami; large coal lands also lie near Columbus, Kan., just to the north of the present lead and zinc field. As this territory becomes more and more developed by lease from the Indians or as the Indians obtain the right to sell the land and it becomes more attractive to outside capital there is a large territory which has no railroad facilities at all and which will offer opportunity for this newest addition to the electric railway field to expand. While no definite plans have been made, yet the management of the road realizes the situation and is awake to the possibilities of expansion, which it will probably undertake during the next four or five years.

And all of this expansion will be under electric traction, for the operating personnel of the road is thoroughly convinced of the efficiency of electrification. Compared with operation under conditions prevailing previous to electrification, the certainty of schedule, the decreased running time, the savings in power and other operating expenses, the general increased operating efficiency of the personnel itself are all features which have come on account of electrification and appeal to the management of the road.

Baltimore Tries Loading Platforms

Experimental Platforms Have Now Been in Use for Several Months—Results Show Their Value for Relieving Congestion and Also for Speeding Up Traffic—Thirteen Installed So Far

SOME months ago the subject of loading platforms was actively discussed in Baltimore between the public authorities and the officials of the United Railways & Electric Company and an experimental pair of platforms 5 ft. wide, 100 ft. long and 9 in. high were erected at North Avenue, at its intersection with Charles Street, which at this point is a thoroughfare 110 ft. wide between curbs, with the car tracks located in the center. On this pair of platforms rigid pipe railings were installed. These railings were carried 3 ft. above the level of the platform.

The results attending this original installation were very satisfactory, from the viewpoint of safety and convenience of passengers, from the standpoint of control of traffic by the police department and because of operating advantages to the railway company. Thereafter additional platforms were put in, until at the present time thirteen have been installed. A number of these were put in at the direct request of the Police Department.

Queue loading is recognized as a very desirable and an effective aid to the rapid handling of passengers onto a car. One very satisfactory development from the use of these loading platforms has been what might be called automatic queue loading, as the comparatively narrow platform, with chains or rails on its outer edge, by its very construction promotes the unconscious adoption of the queue form of loading.

Plans were laid also for the installation of quite a few more platforms, but the Fire Department objected to their being put down in the narrower streets, because it felt that it would interfere with the operation of fire apparatus.

As a result of the Fire Department's objection the railway was unable to put platforms in at a number of locations where a study of conditions at the present time indicated their desirability and the Police Department had requested their installation. The co-operation of the Police Department has been of great assistance in successfully working out the plan, and the results from



LOADING PLATFORMS ON NORTH AVENUE AT CHARLES STREET



AT LEFT, PLATFORMS PRODUCE AUTOMATIC QUEUE LOADING. AT RIGHT, PLATFORM ON LIGHT STREET AT BALTIMORE

the public and operating standpoints have been very satisfactory.

On the original installations pipe rails were erected, but latterly chains have been used attached to upright stanchions, instead of the continuous pipe railing. This was found to be more desirable, because occasionally automobiles run into the platforms, and where the stanchions are connected by chains less damage is done than where a rigid rail extends the whole length of the platform. On the platforms and safety zones the Police Department supplies and maintains red oil lanterns during the night hours. On the ends of the platforms diagonal black and white stripes, similar to those used on railroad crossing gates, have been painted.

At a number of places where the company has been unable to get permission to install platforms because of the narrow streets isles of safety have been established. These were originally constructed with stanchions and iron pipes, making them rigid, but, for the reasons stated above, piping has been abandoned and the stanchions are now joined by chains. In some locations these stanchions had been in use before platforms were introduced, but recently the number of isles of safety have been materially increased.

A special study of traffic conditions at each location was made before platforms were laid down, and where practicable they were located around the corner from congested streets, this necessitating in some instances changing from the standard near-side stop to a far-side stop. This has been of value in relieving congestion.

The platforms are constructed of heavy planking laid on wooden sills and fastened to the street surface with drift pins. Consideration has been given to constructing them in a more permanent manner, with concrete curbs, either filled in with crushed stone or with an all-concrete surface, but for the present, until the experiment has gone further or the present platforms begin to wear out, no change will be made.

The accompanying illustrations indicate the method of locating these platforms and the additional safety which this improvement in the street car facilities of Baltimore provides for the traveling public.

Foreign exchanges record the inauguration of a trackless trolley line $1\frac{1}{4}$ miles in length and with four buses in York, England. The Bradford Corporation Tramway, which already has a number of these cars, has in contemplation a six-wheel trackless trolley bus, with seating capacity of fifty-seven, as well as some one-man buses with seating capacity of thirty each.

Trackless Trolley Demonstration

IN VIEW of the general interest in trackless trolleys, principally because of the present high cost of railway construction and competition from the motor bus, a practical demonstration of a new type trolley bus will be made at the Schenectady works of the General Electric Company the latter part of May.

A thirty-passenger type car, similar in external appearance to the front-entrance trolley car, except that it has rubber-tired wheels, will be equipped with trolley pole, controller, motors and other necessary apparatus for the public demonstration. Suitable trolley wires have been strung, forming a loop for demonstration runs.

General Electric engineers estimate the cost of installing a single-track trolley line on an unpaved street as about \$35,000. On a paved street, where the trolley company is forced to pay for the pavement between its rails and 2 ft. outside, the cost jumps to \$75,000 per mile. The overhead for a single trackless trolley costs from \$5,000 to \$7,000 per mile, and where a double set of wires is strung the cost will average from \$7,000 to \$9,000 per mile. Comparing the operating cost with the motor bus, gas and oil costs on an average of 5 cents per mile, whereas with the trackless trolley the cost of electricity is but 2 cents a mile. The maintenance of equipment, including tires, averages $9\frac{1}{2}$ cents per mile for the motor bus as compared with 4 cents for the trackless trolley. For depreciation, figuring the life of the motor bus at five years, as computed from statistics supplied by nine leading auto bus manufacturers, the cost per mile is 3.4 cents, compared with 1.9 cents for the trackless trolley, based on a life of ten years.

Totalling the above figures, the saving in favor of the trackless trolley is 10 cents per bus-mile. Figuring that the average bus runs 35,000 miles per year this means a saving of \$3,500. From this amount there should be a slight deduction because of the lower initial cost of the motor bus, interest on money invested, etc., which, according to railway engineers, brings the saving in favor of the trackless trolley over its gas-driven competitor to \$2,700 per car per year.

With a sliding trolley pole the trackless trolley has a leeway of 18 ft., 9 ft. either side of the trolley wires. This gives it ample facilities to pass other vehicles on the street. Directly over the head of the driver is a lever by which the trolley pole can be pulled down from the wires without the operator leaving his seat.

After test and demonstration in Schenectady the car will be sent to Richmond, Va., for trial.

Features of the New Paris Franchise

Earlier Agreements, Similar to American Service-at-Cost Franchises, Failed to Stand War Strain—New Deal Involves Consolidation of Properties, 4.9 per Cent Net Return to Investor Guaranteed by the State and Rewards to Management and Men Based on Increasing Traffic and Achieving Economies

THE city of Paris and the Department of the Seine (in which Paris is located) have approved a consolidation and refinancing of the local street railway and motor bus facilities of the most far-reaching nature. At last accounts, the new plan required only the formal consent of the stockholders of the absorbed companies before going into effect. The terms of the new arrangement will best be understood if a brief account is given of the conditions leading up to this franchise.

THE AGREEMENT OF 1910

The General Omnibus Company, organized late in 1854, was a consolidation of several small horse-omnibus companies, and soon after it was founded received a franchise for buses and also for street railways. Under this franchise, which was for fifty-five years, the company not only built a great many street railway lines and extended its bus system but had a practical monopoly of all surface transport within the walls of Paris itself, and it was the only system (except the later underground railways) with which the Municipality of Paris had actual contractual relations.* The exceptions to this monopoly were certain bus lines which the steam railroads were permitted to operate to carry passengers to and from their railroad stations and several street railways which were permitted to enter Paris upon payment to the General Omnibus Company of certain royalties. In consequence of this latter development there were in 1910, when this franchise expired, thirteen street railway companies in Paris and vicinity, and these companies were operating with every conceivable form of propulsion—horses, trolley, conduit, storage battery, compressed air, steam, etc.

In 1910 the Municipality of Paris concluded an agreement with the General Omnibus Company which contained a number of features of general interest, aside from the provisions for motorization of the buses and electrification of the street railways, partly to trolley and partly to the conduit system, the latter being compulsory within certain areas. Among these features were the following:†

Change from Unit to Two-Fare System within City.—Although there had been no startling rise in costs by 1910, the General Omnibus Company seems to have realized that a continuation of the unit fare with free transfer was uneconomic on a system with an ever-growing increase in average length of ride. The unit fares of 15 centimes (3 cents) second class and 30 centimes (6 cents) first class (the latter including transfer privilege) were replaced by a zone system in which the base fare was 10 centimes (2 cents) second class and 15 centimes (3 cents) first class.

Capitalization.—The capital of the General Omnibus Company was increased from 17,000,000 francs to 80,000,000 francs to take care of the reconstruction and electrification expenses. The company was required to set aside annually a sum amounting to not less than 5 per cent of its net profits to retire each year a portion of its stock, though the holders of the stock thus retired received "participation" certificates, entitling them to share in the profits after an initial dividend of 5 per cent had been paid on the unamortized stock and also to participate in any surplus after all stock had been retired at par when the company should be liquidated.

Return to the City.—In the agreement prior to 1910, the return to the city appears to have been confined to the usual paving upkeep tax and a tax based upon the number of cars. The agreement of 1910 retained the paving charge, but replaced the car tax by a charge on gross earnings. It was agreed that the bus system should pay the city 3½ per cent of gross earnings, with a maximum of 4 per cent if the receipts exceeded a certain set figure. On the other hand, the street railway system was to pay 3½ per cent minimum, if the return to stockholders was not more than 5 per cent, up to 6 per cent maximum according to the increase in return received by the stockholders. The city could call for a reduction in fare if the earnings per car-mile or bus-mile exceeded 32 cents and 33 cents respectively. This figure was based on the size of car then in use, but was to be changed according to a specified formula if cars of different capacity were put in service. The bus contract stated that the company would not be obliged to install certain additional routes until the average earnings per bus-mile attained a stated figure. So, too, the company was entitled to apply for higher fares if the average earnings fell below 33 cents per bus-mile, provided it operated a stated minimum mileage per annum. If all such payments to the city plus the local fuel tax (octroi) exceeded 6 per cent of gross earnings, the General Omnibus Company could apply for a reduction.

Full Regulation Retained.—The Municipality of Paris retained all rights to regulate routes, timetables and fares and to exert other police powers, such as approval of rolling stock and other equipment affecting the public safety and convenience. The company's accounts were to be audited by the city, city inspectors were to be carried free and the company was to pay all regulatory expenses up to a stated maximum per mile of route. Fines and forfeiture clauses to put teeth in the regulatory ordinances were also provided.

WHY THE 1910 AGREEMENT BROKE DOWN

The three or four years following the 1910 agreement, including the change to zone fares, saw heavy increases in traffic despite the large amount of reconstruction going on and the growing competition within old Paris of the underground railways. The public, however, felt that the company was not expanding its facilities and

*For further particulars of this franchise see STREET RAILWAY JOURNAL, January, 1897, page 16; May, 1899, page 275, and Jan. 4, 1902, page 18.

†For further particulars of this franchise see ELECTRIC RAILWAY JOURNAL, Oct. 1, 1910, page 505.

improving its service as had been anticipated. In all likelihood, the extensive rebuilding program of the company did not tempt it to develop experimental services which would lower the average return per vehicle-mile to uneconomic levels.

With the arrival of the war in August, 1914, all progress naturally had to cease. In fact, it was necessary to make tremendous cuts in service because of man-shortage and other difficulties incident to the war. By 1916, also, the increase in wages, fuel and materials had become so great that the company applied for relief. It was not until 1918, however, that the first increases in fare were granted upon recommendation of a commission which had been appointed by the Prefect of the Department of the Seine to study both the matter of immediate relief and a permanent settlement.

TERMS OF RECAPTURE AND CONSOLIDATION UNDER GOVERNMENT AUSPICES

At this time there were six surface systems in the Paris metropolitan area as follows: The General Omnibus Company, Tramways-Nord, Tramways-Sud, Est-Parisien, Chemin-de-fer-Nogentais and Rive-Gauche, with a total of 943 km. or 584 miles of route. The capital investment of these companies totaled 420,900,000 francs, or approximately \$81,000,000 at pre-war exchange. The General Omnibus Company alone constituted practically one-half of this total. Both the city and the department were agreed that unified operation of all these lines was the indispensable basis of any post-war arrangement. To purchase these lines outright and operate them jointly offered a host of administrative entanglements.

Aside from this it did not seem feasible to the dominant political parties to go to direct community operation if it were possible to devise a plan whereby the business management of the lines would be retained without injury to the life and business growth of the community.

A plan was finally worked out and proposed which was built on the basis of private management. Following this plan, a contract was first made by the department with the city to reimburse the latter for payments in taxes, etc., which it would have continued to receive under the old franchise. Also by agreement with the city, the department purchased from the General Omnibus Company as of Jan. 1, 1921, all franchises and such properties and equipment as were of direct use in operating the lines. A special clause in the agreement reserved for the city council all powers necessary for the fixing and modification of schedules, fares and routes. Certain supplies, cash on hand and in bank remained the property of the company, but the supplies, under the terms of agreement, could be purchased at cost of manufacture. The terms of sale were to be fixed by a group of experts, three named by the Minister of Public Works, three by the company recaptured and three by the unanimous consent of the first six. In case of failure to choose the last three, the judges of the Court of Appeals were to be asked to name the additional experts. The payment was to be made in sixty semi-annual installments and, in accordance with rules applying to properties operated fifteen years or more, was to be based upon the net average earnings of the best five years out of the last seven years preceding the sale, but in no case was this amount to be less than the net receipts of the last of the seven years of the test period.

The capitalization of the companies included was:

	Capitalization, Francs
General Omnibus Company.....	200,000,000
Tramways-Nord	81,300,000
Tramways-Sud	65,200,000
Est-Parisien	41,400,000
Nogentais	21,000,000
Rive-Gauche	12,000,000

THE LEASE AND THE LEASING COMPANY

While the actual contract with the leasing and operating company is made by the Department of the Seine, the city and the department have an agreement for the purpose of retaining for the city such rights as "long possession confer and vital rights demand." By this agreement a certain exchange of jurisdiction is also accomplished so that the city obtains additional jurisdiction over departmentally licensed railways within the city limits and the department over parts of municipally franchised lines which extend beyond the limits.

Most important of the provisions which form Article 3 of the covenant between the two are: The department shall endeavor to make such modifications of tramway lines within the city limits as the city council may demand by special resolution, after consultation with the commission which will supervise the working clauses of the lease; a similar provision regarding auto-bus routes; an agreement to submit all such changes proposed by the department to the city council; and the city fares cannot be raised or lowered without a special joint resolution of the municipal council of Paris and the council of the department.

The city is also to be the judge as to standards of line, track and paving upkeep, and is to receive certain costs plus a 10 per cent or 15 per cent payment from the company for work done in connection with these matters. Snow removal costs are to be shared equally.

The operation of the superseded companies has been taken over through contract with the Department of the Seine by a new company formed under the direction of Andre Mariage, director-generator of the General Omnibus Company, subject to various conditions as set forth July 12, 1920, by the Prefect of the Seine in a statement to the municipal and departmental councils, and abstracted herewith:

The leasing company is to have a capital of 60,000,000 francs, of which 6,000,000 francs is to be a guarantee fund, provision being made for increasing this fund as the mileage of the railway and bus routes is enlarged. This 6,000,000 francs must be invested in city of Paris bonds or other similarly stable securities approved by the department. The stockholders of the former companies have the first right to subscribe to the new company's stock on an equitable pro rata basis.

The company is to be guaranteed a gross return of 6 per cent on its investment, but the actual return, after income tax deductions and the like, is 4.9 per cent, which is less than the current rate of return on French government bonds.

The department expects that deficits will prevail for some years to come, but it does not wish the company's management to do anything that will limit the usefulness of the system to the public. It has therefore provided two forms of incentive for the operators.

A Reward for Increased Business.—In addition to the guarantee the company is to receive a bonus for increasing the gross receipts. This bonus is 0.75 per cent of the annual gross receipts up to 250,000,000

francs and 1 per cent of the gross receipts in excess of this amount. From this fund must be paid the salaries of the executive officers and of the directing board and inspectors of accounts. Good management is defined as consisting, in effect, of serving the largest population possible; and it is added that any economies realized must not result in a reduction in the number of passengers. (The actual French for the last eight words reads "de la compression des voyageurs!") The rank and file employees will receive a premium equivalent to 4 per cent of the gross receipts from traffic and advertising.

A Reward for Operating Economies.—The company will also be entitled to reward for any operating economies that do not lower the standard of service. This reward may be expressed by the formula: $0.04 \times (R - 0.65 E)$ in which "*R*" represents the gross receipts and "*E*" represents "operating" expenses as defined hereinafter. Out of this fund, 300,000 francs a year must be placed in a special reserve fund until the latter attains 3,000,000 francs and it must be kept at that amount. The purpose of this reserve is to have funds to make payments to the guarantee fund as the lines grow and to pay any penalties which may be levied against the company.

If the earnings, after subtraction of the awards, permit an 8 to 10 per cent dividend on stock or addition to surplus the extra above 6 per cent is to be divided between the department and the company. If there is enough to pay 10 per cent or more, the department will get three-fourths of the remainder.

ACCOUNTING METHODS

The accounts are divided under three heads as follows:

Financial, operating and remuneration. "Financial" covers all charges relating to the recapture annuities, certain minor war annuities, interest on reconstruction loans advanced by the department, etc. "Operating" not only includes the usual items connected with running a transportation system, but also include the cost of governmental regulation, of certification of accounts, of amortization of new investment in thirty years, of interest on guarantee and reserve funds, insurance, maintenance, renewals, and generally of all items not included under "financial" except the 6 per cent guarantee on investment and the efficiency awards which come under the head of "remuneration."

The company in taking over the properties guarantees to leave all employees undisturbed in their wages, seniority, privileges, etc., reserving merely the right to make changes in the case of employees receiving more than 25,000 francs per annum. It also agrees to continue the system of Workers' and Discipline Councils which were a characteristic of the General Omnibus Company's relations with its men. All employees must be French and must be chosen, so far as possible, from those who have lived at least three years in the Department of the Seine or in the contiguous departments; in the case of the latter the proportion of employees engaged should be in proportion to the mileage in their native department.

While the lease is for thirty years, the Department of the Seine reserves the right to annul the contract any sixth year upon two years' notice. In this event, the company will be reimbursed by the department for any capital not amortized and will receive the following amounts which are intended mainly to indemnify the

executive officials; possibly to liquidate long-term contracts with these officials:

2,000,000 francs if annulment occurs Jan. 1, 1927.

1,750,000 francs if annulment occurs Jan. 1, 1933.

1,500,000 francs if annulment occurs Jan. 1, 1939.

1,000,000 francs if annulment occurs Jan. 1, 1945.

The Prefect of the Seine will form a consulting board made up of an equal number of representatives from the city and departmental councils plus representatives from the company, various government departments, commercial and labor bodies, etc., but these outside members must not outnumber those from the two councils. The chairman, also named by the Prefect, will cast the deciding vote in case of equal division. The functions of this board are purely advisory and cover only such topics as the Prefect assigns to it for consideration. This commission will study the allocation of the 4 per cent gross receipts bonus previously mentioned.

A more important commission is the control board made up only of representatives from the two councils and the administrative staff of the Prefect. This board will be the actual regulatory body so far as operation, audit and changes in executive personnel are concerned.

Trackless Trolleys in Germany

A RECENT inquiry in regard to trackless trolleys in Germany shows that before the war there were only three such lines in that country, one in Saxony, one in South Germany and one in Westphalia. Of these three lines only the first mentioned is now in operation, while the two others stopped work during the war. These three lines had only a total of 12 miles. The line now in operation is used as an auxiliary extension to the electric railway system of the town of Wurzen in Saxony. The two other lines served as communications between small towns.

As to financial results, the cost of installation was found to be only one-fourth to one-third of an ordinary line with tracks, but the maintenance of rolling stock cost 25 per cent more. The running expenses were found to be somewhat lower than in the case of motor-bus lines. A prime condition of the trackless trolley is a well-paved road surface and no attempt has yet been made to use this form of traction with unpaved roads. The cost of installation of the overhead wire before the war was 16,000 marks per mile, and is now from 100,000 to 160,000 marks a mile.

The line in Saxony is using cars of 3 tons in weight, with space for from twenty to twenty-four passengers, ten to fourteen of whom can be seated. The cars have solid rubber tires. In times of ordinary traffic they are run with one man. The cars are using a short-circuit brake, trolley poles of the most simple design and motors of 15 to 25 hp. with worm drive. The cost per car before the war used to be 40,000 marks and is now 100,000 to 125,000 marks. The present wages paid to the attendants on the Wurzen line are 5 to 7 marks per hour. The fare, which before the war was only 5 to 10 pfennigs, has, in the case of the one line in operation, risen to 30 pfennigs. Only in one case are data given as to total cost of running operations and revenue per kilometer. The first was 21½ pfennigs, and the second 24½ pfennigs in 1912. The German Street Railway Association, which collected these data, declares that trackless trolley lines have found little favor in Germany and there is no likelihood of their development in the future.

No Reason to Change Standard Birney Safety Car Design

An Analysis of the Situation Is Convincing Proof that the Present Standard Should Be Retained Until Some Definite and Reasonable Arguments Are Forthcoming

BY W. H. HEULINGS, JR.

Vice-President and General Sales Manager the J. G. Brill Company

THE article by J. C. Thirlwall, General Electric Company, which appeared in the April 16 issue of the *ELECTRIC RAILWAY JOURNAL* under the caption "Why Alter the Standard Safety Car Design?" was an excellent presentation of sound and sensible facts which deserve the thoughtful attention of all officials of street railways having safety cars in service or in contemplation.

The advantages of standardization to railway companies are so great that every precaution should be taken that no change in safety car design should be requested which will destroy the manifold advantages of the present standard design by increasing the weight of the car, the cost of operation and the cost of production and by lengthening the time of delivery.

WILL BUILD SPECIAL SAFETY CARS

The J. G. Brill Company built the eight special double-door safety cars for Madison and the four double-door cars for Lancaster, these being the only cars out of 2,839 safety cars our plants have built which have double doors. The remaining 2,827 cars have the standard single door and are responsible for the remarkable savings and earnings which have been attributed to safety cars generally. We do not recommend anything but the standard Birney safety car as designed, but where demanded we will make changes at a higher cost and longer delivery, but we certainly advise against such deviations from standard.

SMALLER CARS AND MORE OF THEM

From reports received from Madison it is evident that both the public and the railway company are satisfied with the double-door arrangement on the cars which we built for them. It would be foolhardy to deny that the simultaneous ingress and egress of passengers is quicker than with the single door, but what does this amount to? If the time saved is sufficient to warrant the additional expense and the loss in power saving which results from the increased weight, then the double-door car possesses an economic advantage. This is, in my judgment, very uncertain; in fact, I should almost say, "It certainly is not." Our experience with the safety car indicates that railways making their installations on ratios which mean more frequent service to the public have had the best results, and there is no overcrowding as there is sufficient space for the standing passengers on each car.

PUBLIC MUST BE CONSIDERED

In installing safety cars on a car-for-car basis advantage is taken by the operating company of the saving in platform wages and power consumption, but the public loses car space. They may get the same number of seats, but if the same number of standing passengers are jammed into a smaller space naturally they'll be dissatisfied and no one can blame them for kicking loud and long.

It is true that Madison tried out five standard Birney

safety cars but, as stated in the March 12 issue of the *ELECTRIC RAILWAY JOURNAL*, the installation was made on a car-for-car displacement basis. This should certainly be taken into consideration when analyzing the safety car experience in that city.

SAFETY CAR MUST BE SMALL

To increase the length and other dimensions of the standard safety car is simply to defeat its object. In order that operating companies may reduce headways to compete with other forms of transportation by running more cars it must be possible to do this at less total cost than previous service, and this is only possible with the use of smaller light-weight units.

Mr. Thirlwall referred to another installation where the manager of the road changed some of his cars to a double-door platform type. This company had already improved its service by reducing its headways and it was only the desire on the part of the manager to speed up loading and unloading by the simultaneous ingress and egress of passengers that prompted him to convert these cars to a double-door arrangement. He soon found that the advantage in loading and unloading time gained was offset by other difficulties which are attendant to double-door operation on one-man cars and then rechanged his cars to the smaller standard single-door platform.

It is therefore evident that there has really been no convincing argument advanced that a change of the standard design of the Birney safety car to a double-door platform arrangement would satisfactorily meet general operating conditions and at the same time retain for the railway companies the maximum economies in initial cost and in cost of operation.

The city of Terre Haute, Ind., has certainly made a success of safety car operation, and since the safety cars have been in service this city has been visited by railway managers not only from cities in this country but also from foreign countries, and the fact must not be lost sight of that, during the course of an address at the convention of the American Electric Railway Association in Atlantic City last year, E. M. Walker, general manager of the railway lines, stated, "We attribute our success with safety cars principally to the fact that we have stuck religiously to the standard car."

Changes Proposed in British Classification

A COMMITTEE of British accountants of tramway undertakings has been considering revisions in the standard form of tramway accounts. The present form was drafted in 1904 by a joint committee of the Institute of Municipal Treasurers and Accountants and the Municipal Tramway Association, and since has been adopted by practically all municipal tramway undertakings and some of the companies operating tramways. Time has shown that different interpretations have been placed upon the directions given in the standard form. In consequence, the municipal tramway managers at Leeds, Sheffield and Manchester and the London group of company-owned tramways arranged for a conference of the accountants of those organizations. The accountants met in December of last year and have now recommended some alterations and additions to the standard form, without, however, fundamentally changing it.

Lists of accounts were also recommended for motor bus operation and trackless trolley operation.

The Engineer and Eminent Domain^{*}

Legal and Engineering Problems in Condemnation Procedure Analyzed
and Various Pitfalls Pointed Out—Determination of Advisability
of Condemnation Sometimes Difficult—Complete History Is
Given of One Condemnation Case, with All Documents

By CHARLES R. HARTE

Construction Engineer the Connecticut Company, New Haven, Conn.

EMINENT domain is the right or power of a sovereign state to appropriate property to particular uses for the purpose of promoting the general welfare. Whether, as was said by the Supreme Court of Connecticut, it "is a reserved right attached to every man's land, and paramount to his right of ownership," or whether, as is more generally held, it is a power which the state may exercise for the welfare of the community, is of much less consequence to the engineer than the fact that there is a power by which property needed to promote the general welfare of the public may be taken from the owner when for any reason he is unwilling to dispose of it at a fair price. Unlike the police power, however, which regulates the use and enjoyment of a man's own property by himself so that he shall not interfere with the general welfare of his community and compels him to submit, without compensation, to any inconvenience or loss he suffers in consequence of that regulation—the Volstead act being a shining example—eminent domain is a forcible exchange, and the taking can be effected only when just compensation is made to the owner.

THE LEGAL SITUATION

The power is a legislative one and may be delegated by the Legislature, to any one properly authorized, to promote the general welfare of the public. Unfortunately, however, the courts have been by no means agreed as to just what is such a proceeding, and while the Legislature delegates the right and must therefore decide upon what it considers a public use, the correctness of this opinion is subject to the decision of the courts, and as one perplexed judge said, "No question has ever been submitted to the courts upon which there is a greater variety and conflict of reasoning than that presented as to the meaning of the words 'public use' as found in the different state constitutions regulating the right of eminent domain." A striking example of this difference of opinion is seen in Connecticut and Rhode Island decisions. In the first state a transmission line between the power and substations of an electric railway is a public use, and, provided of course the company is authorized to exercise the right of condemnation, the necessary right-of-way may be taken by eminent domain. In the sister state just east, however, "that which pertains simply to means of supply is the private business of the company," and the Rhode Island Suburban Railway was consequently unable to exercise the power that way. And because the power is an unusual and a "harsh" one, the courts quite generally have been very critical both to be sure that the company or person actually had been delegated the power and that its exercise was in strict accordance with the rights it had.

From the legal standpoint, then, in case condemnation

is under consideration, it is essential to know, first, whether the company actually has received the right from the Legislature; second, whether the proposed use of the property desired is one which the courts of the state in which it is, have accepted as "public," or, at least, is not one they have classed as a "private" use, and, finally, that the proceeding itself is in strict accordance with the requirements of the state. It is therefore highly important that the legal advisers be not only good lawyers but that they be also familiar with condemnation proceedings as administered in the state involved.

IS CONDEMNATION WISE?

Before condemnation proceedings are started, it is well for a company to consider what is involved and what is to be gained.

In delivering the opinion of the United States Supreme Court in the Minnesota rate cases, Justice Hughes said of the railroad: "It is equipped with the governmental power of eminent domain. In view of its public purpose it has been granted this privilege in order to prevent advantage being taken of its necessities. It would be free to stand upon its legal rights, and it cannot be supposed that they would be disregarded."

Unfortunately, while this is perfectly true from the legal point of view, it disregards a practical fact that is often of the greatest importance. Under favorable conditions the proceedings may be short and sweet, and in a few states after a preliminary hearing the company, upon depositing an approved bond with the court, may proceed with the work while the lawyers fight out the questions of the final settlement. In the large majority of the states, however, it is possible for the owner to prevent possession for a very considerable time. If the proceedings have been started well in advance of the date on which the property is necessary, this may cause but little trouble; more usually these cases arise at the last minute. Of course, if the owner refuses to sell on any terms, and the project is not to be abandoned, there must be condemnation or relocation. Such cases, however, are comparatively rare. The trouble usually arises over the amount. It then becomes an interesting question what to do; namely, (1) condemn, and have the expenses of the proceeding and the interest on the investment kept idle until possession is obtained, and in many cases the increased cost of the work which has to be done in an adverse time because of the delay to be added to the award for the land, or (2) pay out of hand the price asked and save the costs and annoyances of the holdup, but establish a precedent which may make trouble later on, and is unfair to those who sold at a reasonable price.

At the time of the Minnesota rate cases, although every one who had had experience in buying right-of-way knew that its cost averaged materially higher per acre or square foot than similar adjacent land, there

^{*}See "The Engineer and the Right-of-Way," by Mr. Harte, *ELECTRIC RAILWAY JOURNAL*, June 26, 1920, page 1301.

were available no definite proofs of the claim made by Mr. Cooper of the Northern Pacific, that while city land cost but little more per unit when bought for right-of-way than for other purposes, farm lands averaged in cost three times as much for the one purpose than for the other. The court refused to accept his belief, but recent investigations in connection with the federal valuation of the railroads, however, indicate that Mr. Cooper was quite right. In view of the facts that the ratios for the several classes of land do not materially vary in different parts of the country, it may fairly be considered that the costs of condemnation and the consequent delays, but not including the normal price of the land condemned, in the case of farm lands are at least double the normal price of all the farm lands of the right-of-way; that in the case of suburban land the extra cost is equal to the normal price, while in city land the excess is about one-fourth, normal price referring to the price which would be paid for similar land in ordinary parcels and sales.

The moral of this is that condemnation is expensive, and the possibility of adjustment in a different way should be carefully considered before it is employed.

THE ENGINEERING SITUATION

If it has been decided that condemnation must be resorted to, the engineering features demand consideration. While there are wide differences of opinion as to many legal features, the authorities are quite generally agreed that the actual taking must very closely follow the petition.

If the taking describes a strip of sufficient width for all structures there will be little difficulty provided it is not held unnecessarily large—some of the states are very strict in this respect—but particularly in the case of a transmission line; locations for the individual poles, guys and other elements can usually be obtained with far less trouble and expense, and if the description is properly made and includes right of access, such a taking serves as well as a strip unless changes are necessary at a later date.

Just what should be included in the description depends upon the attitude of the courts. In some states it has been held that the right of the company to exercise the power of eminent domain should be most carefully considered, but once its right to employ it is established the intent of the Legislature rather than a literal interpretation should be considered. In others a most exact compliance with all the forms has been insisted on. As it is desirable to have the taking as elastic as may be safe, this is a matter which calls for close co-operation between engineer and counsel, and the former should not forget that the owner's title extends above and below the surface of the ground, and that the wires between the poles, the overhang of the cross arms, and the underground portions of anchors and braces occupy the property no less than the poles themselves, and, further, that the right of location does not of necessity carry with it the right of entry at a later date for the purpose of maintenance and replacement. Still further, it should be remembered that a long pole cannot be taken around a sharp bend in a narrow right-of-way without overhanging adjacent land and that a right of access to the line for the purpose of maintenance may be held to apply only to the land of the grantor, and not to give the right to team or go over it to reach a part of the line on other land unless it is so stated. Finally, not only should there be set out

the right to trim to a definite distance from the center line all existing trees, but it should also be borne in mind that old trees grow and new ones are planted from time to time, and the right should definitely provide for proper future trimming. In New York "the right to trim such trees as may be necessary to protect said line from interference" was held too indefinite a statement to permit the determination of the damage to be compensated for.

It should not be supposed that every case of condemnation involves such complications, however. Probably in nine cases out of ten, even with a very faulty taking, no questions will be raised, but in case of trouble the matter may prove very serious, as there have been decisions holding that one condemnation exhausted the power, and it is the part of wisdom to be sure rather than sorry.

THE ACTUAL TAKING

The details of the actual taking differ materially in different states, but there are certain general features common to nearly all. It is generally necessary to state that the parties cannot agree upon a price, and there must be a vote by the proper parties that the property in question, so described as to definitely fix it, be taken. Thereafter come such hearings, viewings, determination of damage, awards, appeals, and final decisions as may be required by the state in which the land or property is located.

It may be of interest to see just what steps were followed in a case in Connecticut, where, however, the award was not appealed.

PROCEDURE FOLLOWED IN CONNECTICUT

In 1917 the Connecticut Company found it desirable to build a transmission line between New Haven Station "A" and North Haven, and having made a location, on July 21, 1917, filed with the Public Utilities Commission a petition (Exhibit I) for the approval of the location and the method of construction, whereupon the commission appointed (Exhibit II) a date for a hearing when all parties might be heard, and, following the hearing, made a finding of approval (Exhibit III).

Most of the desired location was secured with little trouble, but one John S. Palmer, while not hostile to the company—in fact, the action was rather a friendly one—asked a price which seemed all out of reason. Accordingly on Nov. 3 the directors of the Connecticut Company voted (Exhibit IV) to locate upon and take the necessary land. The petition to the commission for the taking asked a reapproval of the plans, since the first plan did not show the necessary detail for condemnation. This petition and the notice of a hearing on it were repeated in the finding of necessity (Exhibit V). Then followed a petition (Exhibit VI) to the Superior Court to appoint appraisers; the court order (Exhibit VII) for a hearing on the taking; the hearing, at which appraisers were presented to the court and accepted (taker and owner each select one and these two choose a third); the formal court approval (Exhibit VIII); the trips of the appraisers to the spot to view the land and determine the damage; and, finally, the return (Exhibit IX) of the appraisers to the court, which has the effect of a court judgment. It will be seen that from the vote of the directors on Nov. 3 to the judgment was a trifle over sixty days. This was a friendly suit, speeded by all, with no appeal. In the Stevens case, also in Connecticut, the matter was dragged out for five years.

Documentary Exhibits in the Palmer Condemnation Case

Exhibit I—Petition for Approval

TO THE HONORABLE PUBLIC UTILITIES COMMISSION OF THE STATE OF CONNECTICUT.
The petition of the Connecticut company respectfully represents:

1. That it is a company organized and existing under and by virtue of a charter granted by the General Assembly of the State of Connecticut, for the purpose of constructing and operating street railways, and having its principal office at New Haven in said State.

2. That it has the right to construct a transmission line consisting of two circuits, each of three stranded 2/0 copper cables on porcelain insulators with metal pins bolted to 3½ x 4½ yellow pine cross arms having angle iron braces, all on "Class B" chestnut poles, details being shown on the attached sketches, said line to run from Station A of said Connecticut Company in New Haven on the poles carrying the present Branford transmission line as far as Middletown Avenue, New Haven, and thence on private way and along and across highways as shown on the accompanying plan to the North Haven substation of said Connecticut Company.

3. That it has caused to be made a plan showing the highways in and through and over which it proposes to build said transmission line and also detail plans showing the construction at highway, railroad and wire line crossings, which first named plan is entitled, "The Connecticut Company—New Haven Lines—Office of Construction Engineer, New Haven, Conn.—Proposed transmission line—Station A, New Haven to North Haven substation—Scale 1:20,000 Date July 21, 1917," and which detail plans, of which four show pole top construction and twelve show crossings set forth in their respective titles, the location of each kind of construction and of each crossing.

WHEREFORE, it prays your Honorable Body, after public notice and hearing thereon, to accept and adopt said plan, and make all necessary orders to render available the location of said transmission line and its structures as approved by your Honorable Board.

Dated at New Haven, Conn., this twenty-first day of July, 1917.

THE CONNECTICUT COMPANY,
by Charles Rufus Harte,
Construction Engineer.

Exhibit II—Notice of Hearing by Public Utilities Commission

PUBLIC UTILITIES COMMISSION STATE OF CONNECTICUT DOCKET NO. 2437.

In the matter of petition of the Connecticut Company for approval of proposed method and manner of construction of a transmission line from station "A" of said petitioner in the city of New Haven to Middletown Avenue in said city, and thence on private way and along and across highways in the town of North Haven.

On July 23, 1917, the following petition was presented:

STATE OF CONNECTICUT, OFFICE OF THE PUBLIC UTILITIES COMMISSION.

Upon the foregoing it is ordered that same be heard at the office of the commission in Hartford, Room No. 47, State Capitol, on Monday, July 30, 1917, at 11:30 o'clock in the forenoon and that notice of the time and place of said hearing be given to the petitioner, to the city of New Haven, to the town of North Haven and to the various pole line companies whose wires it is proposed to cross, by Henry F. Billings, secretary of this Commission, by forwarding by registered mail, true and attested copies of said petition and of this order of notice for hearing, addressed one to Victor S. Curtis, secretary the Connecticut Company, New Haven, Conn., one to the Mayor and Board of Aldermen of the city of New Haven, Conn., one to the Board of Selectmen of the town of North Haven, North Haven, Conn., one to the Southern New England Telephone Company, New Haven, Conn., one to the United Illuminating Company, New Haven, Conn., one to George M. Yorke, vice-president Western Union Telegraph Company, No. 195 Broadway, New York, N. Y., one to S. L. Hays, general foreman Western Union Telegraph Company, New Haven, Conn., one to Postal Telegraph-Cable Company, Connecticut Mutual Building, Hartford, Conn., and one to Arthur E. Clark, secretary the New York, New Haven & Hartford Railroad, New Haven, Conn., on or before the twenty-fourth day of July, 1917, and due return make hereon.

Dated at Hartford, Conn., this twenty-third day of July, A. D., 1917.

PUBLIC UTILITIES COMMISSION,
By Henry F. Billings,
Secretary.

Hartford County, ss.

Hartford, July 24, 1917.

Then I deposited in the post office in Hartford, by registered mail, true and attested copies of the foregoing, addressed to the parties as directed in said order.

Attest:

Henry F. Billings,
Secretary.

Exhibit III—Finding of Commission on Petition for Approval

PUBLIC UTILITIES COMMISSION STATE OF CONNECTICUT, DOCKET NO. 2437.

In the matter of petition of the Connecticut Company for approval of proposed method and manner of construction of a transmission line from station A of said petitioner in the City of New Haven to Middletown Avenue in said city, and thence on private way and along and across highways in the town of North Haven.

On July 23, 1917, the following petition was presented.

(Here followed the petition in full.)

The foregoing petition was duly assigned for hearing at the office of the Commission on Monday, July 30, 1917, at 11:30 o'clock in the forenoon, at which time and place the parties appeared and were fully and finally heard. Several of the companies whose lines will be crossed by the proposed construction appeared at said hearing but offered no objection to the granting of said petition. Petitioners stated the general purposes of the proposed construction and the specifications under which it would be carried out. Blue print plans referred to in the petition were explained at said hearing. It was stated that in general the method of construction would follow the specifications approved by the United States Bureau of Standards as set forth in the National Electric Safety Code, so-called, issued November, 1916. It was stated that the normal length of span between poles would be 125 feet but that owing to topographical conditions and presence of structures of other companies, the span distance would be somewhat increased at certain points, but that in such cases the extra span length would be compensated for by additional strength of construction.

Upon consideration of all the facts shown at said hearing we are of opinion and find that approval should be and it hereby is given for the construction by the Connecticut Company of a transmission line from Station A, so-called, of said Connecticut Company in New Haven, on poles carrying the present Branford transmission line of said company, as far as Middletown Avenue, New Haven, and thence on private way and along and across certain highways to the substation of said Connecticut Company, in the town of North Haven, as shown on blue print plan on file in this office and made a part hereof, which plan is entitled: "The Connecticut Company, New Haven Lines, Office of Construction Engineer, New Haven, Conn. Proposed transmission line Station A New Haven to North Haven, Substation. Scale: 1/200,000, July 21, 1917. Drawn by A. L. C. Traeed by A. L. C. Approved Charles Rufus Harte, Construction Engineer." Said construction to be in accordance with specifications approved by the United States Bureau of Standards as set forth in the National Electric Safety Code, so-called, issued by said Bureau November 15, 1916, and as more particularly shown on blue print plans on file in this office and made a part hereof which plans, consisting of four blue print sheets showing pole top construction, one blue print sheet showing construction at angle points, and thirteen blue print sheets showing construction at crossings of highways and lines of other companies are sub-titled respectively as follows:

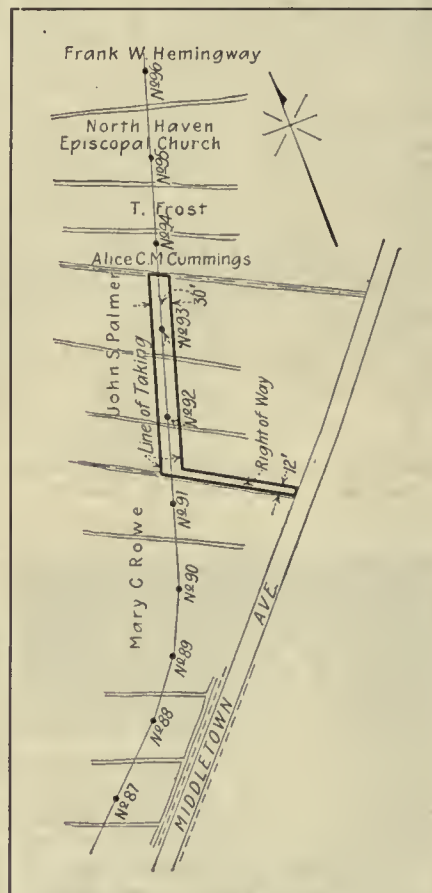
1. New Haven-North Haven transmission line; pole top construction on special crossing poles with 11,000 and 33,000 volt circuits.
2. Pole top construction on poles with 11,000 and 33,000-volt circuits, wood poles.
3. Normal pole top construction, wood poles.
4. Pole top construction on special crossings poles carrying 33,000-volt circuits.

1. New Haven-North Haven transmission line; construction at angle points.

1. Proposed transmission line, station A New Haven to North Haven substation, main highway crossing.
2. Crossing over Northford highway.
3. Old highway crossing, North Haven, Conn.
4. Crossings over main highway and Connecticut Company tracks.
5. Crossing over highway bridge near Muddy River.
6. Crossing over New York, New Haven & Hartford Railroad at Muddy River.
7. Crossing over Montowese Railroad Station.
8. Crossing over New York, New Haven & Hartford Railroad at Middletown Avenue.
9. Crossing over New York, New Haven & Hartford Railroad near Quinnipiac River.
10. Crossing over Ferry Street—Middletown Avenue.
11. Main Street and Peck and Blatchley Avenue crossings.
12. James and Humphrey Streets and Railroad crossings.
13. Grand Avenue crossing.

the normal length of span between poles to be not exceeding 125 ft. and whenever a longer span is found to be necessary the method of construction shall be such as to accord the same factor of safety as exists under the normal construction with 125 ft. span.

We hereby determine and direct that notice of the foregoing be given to the petitioner, to the city of New Haven, to



CONNECTICUT COMPANY'S PLAN, SHOWING LAND TO BE CONDEMNED AND TAKEN FROM JOHN S. PALMER. THIS PLAN IS PART OF EXHIBIT IV

the town of North Haven, and to the various pole line companies whose wires it is proposed to cross, by Henry F. Billings, secretary of this Commission, by forwarding by registered mail, true and attested copies hereof, addressed one to Victor S. Curtis, secretary the Connecticut Company, New Haven, Conn., one to the Mayor and Board of Aldermen of the city of New Haven, New Haven, Conn., one to the Board of Selectmen of the town of North Haven, North Haven, Conn., one to the Southern New England Telephone Company, New Haven, Conn., one to the United Illuminating Company, New Haven, Conn., one to George M. Yorke, vice-president,

Western Union Telegraph Company, 195 Broadway, New York City, one to S. L. Hays, general foreman, Western Union Telegraph Company, New Haven, Conn., one to Postal Telegraph-Cable Company, Connecticut Mutual Building, Hartford, Conn., and one to Arthur E. Clark, secretary, the New York, New Haven and Hartford Railroad Company, New Haven, Conn., on or before the Ninth day of August, 1917, and due return make hereon.

Dated at Hartford, Connecticut, this third day of August A. D., 1917.
 RICHARD T. HIOGINS } PUBLIC UTILITIES
 C. C. ELWELL } COMMISSION
 Hartford County, ss.:

Hartford, Aug. 9, 1917.
 I hereby certify that the foregoing is a true copy of the original order as on file and record in this office.

Attest:
 By Henry F. Billings,
 Secretary.

Exhibit IV—Vote of Directors to Condemn Land of John S. Palmer

At a regular meeting of the directors of The Connecticut Company held in the general offices of the company in the Second National Bank Building, 129 Church Street, New Haven, Conn., on Saturday, Nov. 3, 1917 at 10:45 a.m.

On motion, duly seconded, the following resolution was unanimously adopted:

"RESOLVED: That in connection with Authorization No. 2538 to build a transmission line between New Haven and North Haven, public necessity requires that the extension of the already existing transmission line be located upon and across land, the record title of which is in Harry V. Santry, of New Haven, Conn., but to which John S. Palmer, of said New Haven, claims to have an interest, said land being in the town of New Haven, county of New Haven and State of Connecticut, and bounded and described as follows:

"Southeast by Middletown Avenue; Southwest by land formerly of Albert Good-year, now of Mary C. Rowe; Northwest by the creek, and Northeast by land formerly of T. Foisie, now of Alice C. M. Cummings; containing four and one-half (4½) acres, more or less, being salt meadow. All as shown on attached plan, entitled: 'The Connecticut Company, New Haven, Lines, Office of Construction Engineer, New Haven, Conn. New Haven-North Haven Transmission Line. Location across John S. Palmer, Nov. 3, 1917,' and

"RESOLVED: That the Connecticut Company locate said transmission line upon the land above described, and take all land needed therefor."

A true copy of record,
 (Signed) V. S. Curtis,
 Secretary.

Exhibit V—Finding of Commission on Petition to Fix Limits of Taking

PUBLIC UTILITIES COMMISSION, STATE OF CONNECTICUT, DOCKET NO. 2604.

In the matter of petition of the Connecticut company for reapproval of construction of a transmission line in the city of New Haven and town of North Haven, as appears on file under Dockets Nos. 2437 and 2437A, dated Aug. 3, 1917 and Sept. 13, 1917, respectively.

On Nov. 15, 1917, the following petition was presented:

TO THE HONORABLE PUBLIC UTILITIES COMMISSION OF THE STATE OF CONNECTICUT.
 The petition of the Connecticut Company respectfully represents:

1. That it is a company organized and existing under and by virtue of a charter granted by the General Assembly of the State of Connecticut, for the purpose of constructing and operating street railways, and having its principal office at New Haven in said State.

2. That on the eighteenth day of September, 1917, after public notice and hearing, your Honorable Commission approved plans for locating, constructing, and maintaining certain foundations, posts, poles, and wires and all appurtenances thereto necessary for the operation of the railway of the Connecticut Company by electricity, as more fully appears in Docket No. 2437 and Docket No. 2437A in the files of your Honorable Commission.

3. That the location of said foundations, posts, poles, wires and appurtenances, calls for the same to cross certain land in the city and county of New Haven, the record title of which stands in the name of one Harry V. Santry, as more definitely shown on blue print hereto attached, and entitled: "The Connecticut Company, New Haven Lines, Office of Construction Engineer, New Haven, Conn. New Haven to North Haven Transmission Line. Location across John S. Palmer. Scale 1" = 100'. Approved, Charles Rufus Harte, Construction Engineer."

4. That one John S. Palmer, residing on Quinnipiac Avenue, in the town of North Haven, Conn., also claims an interest in said land.

5. That said John S. Palmer refuses to grant permission to the Connecticut Company to erect its posts, poles, wires and other appurtenances across said land.

Wherefore, said the Connecticut Company prays your Honorable Body, after notice to said John S. Palmer, to re-approve said construction and to prescribe upon said land the limits within which real estate shall be taken for the purposes approved in Docket No. 2437A, and to give written approval to said the Connecticut Company of the location as limited by you.

Dated at New Haven, Conn., this fifteenth day of November, 1917.

THE CONNECTICUT COMPANY,
 By S. W. Baldwin,
 Its Attorney.

STATE OF CONNECTICUT, OFFICE OF THE PUBLIC UTILITIES COMMISSION.

Upon the foregoing it is ordered that same be heard at the office of the Commission in Hartford, Room No. 47, State Capitol, on Monday, Nov. 26, 1917, at 11:30 o'clock in the forenoon and that notice of the time and place of said hearing be given to the petitioner, to Harry V. Santry, in whose name stands the record of title of certain land proposed to be crossed, and to John S. Palmer, also claiming an interest in said land, by Henry F. Billings, secretary of this Commission, by forwarding by registered mail, true and attested copies of said petition and of this order of notice for hearing, addressed one to Victor S. Curtis, secretary, the Connecticut Company, New Haven, Conn., one to Harry V. Santry, 134 Grand Avenue, New Haven, Conn., and one to John S. Palmer, Quinnipiac Avenue, North Haven and City of New Haven, Conn., on or before the nineteenth day of November, 1917, and due return make hereon.

Dated at Hartford, Conn., this nineteenth day of November A. D., 1917.

PUBLIC UTILITIES COMMISSION,
 By Henry F. Billings,
 Secretary.

Hartford County, ss.

Hartford, Nov. 19, 1917.

Then I deposited in the post office in Hartford, by registered mail, true and attested copies of the foregoing, addressed to the parties as directed in said order.

Attest:
 Henry F. Billings,
 Secretary.

Exhibit VI—Petition to Superior Court to Appoint Appraisers

THE CONNECTICUT COMPANY

vs.

JOHN S. PALMER

Superior Court
 New Haven County

In the matter of the application of the Connecticut company for the appointment of appraisers to estimate damages for the taking of real estate.

THE HONORABLE JAMES H. WEBB,
 A Judge of the Superior Court:

The application of the Connecticut Company, a corporation organized and existing under and by virtue of a charter granted by the General Assembly of the State of Connecticut, for the purpose of constructing and operating street railways, and having its principal office at New Haven in said state, respectfully represents:

1. That your applicant on the third day of November, 1917, by a vote of its Board of Directors of that date, took for railway purposes the land described in said vote, for the construction, maintenance or operation of necessary and properly supported conductors of electricity for the transmission of electricity from New Haven upon its railway where said electricity is generated to North Haven; in said State, where said electricity is to be applied, as more fully appears in said vote which is attached hereto, marked "Exhibit 'A,'" and made a part hereof.

2. That on the twenty-seventh day of December, 1917, the Public Utilities Commission of the State of Connecticut, under its Docket No. 2604, approved the taking of said land and limited the location of said land to be taken, as more fully appears in copy of said Docket No. 2604, which is attached hereto, marked "Exhibit 'B,'" and made a part hereof.

3. The only party now claiming an interest in said land is John S. Palmer, who resides on Quinnipiac Avenue, in the Town of North Haven, County of New Haven, and State of Connecticut.

4. Your applicant is unable to obtain said land by agreement with said John S. Palmer.

Wherefore, your applicant applies to Your Honor to appoint appraisers, as provided by statute, to estimate all damages that may

arise to any person from the taking and occupation of the above described real estate for railway purposes, and asks that Your Honor will further order that reasonable notice of this application be given to said John S. Palmer.

Dated at New Haven, Conn., this twentieth day of December, A.D., 1917.

THE CONNECTICUT COMPANY,
 By S. W. Baldwin,
 Its Attorney.

Exhibit VII—Court Order for Hearing on Taking

THE CONNECTICUT COMPANY
 vs.
 JOHN S. PALMER

Superior Court
 New Haven County

In the matter of the application of the Connecticut Company for the appointment of appraisers to estimate damages for the taking of real estate.

The foregoing application of the Connecticut Company praying for the appointment of appraisers to estimate all damages that may arise to John S. Palmer from the taking and occupation of real estate for railway purposes, as set forth in said application, having been presented to me, a Judge of the Superior Court, it is

ORDERED that the same be heard and determined before me at ten o'clock in the forenoon on the third day of January, A.D. 1918, at the Superior Court Room in New Haven, and that notice of the pendency of said application and of this order be given to said John S. Palmer, the party in interest, by some proper officer or indifferent person, by personally presenting to said John S. Palmer, or leaving at his place of residence, a true and attested copy of said application and of this order, and return make of his doings under this order.

Dated at New Haven, Conn., this thirty-first day of December, A.D., 1917.
 (Signed) JAMES H. WEBB,
 A Judge of the Superior Court.

Exhibit VIII—Court Approval of Choice of Appraisers

In the Matter of the Application
 of THE CONNECTICUT COMPANY, a
 corporation, of New Haven,
 Connecticut.

vs.

JOHN S. PALMER,
 of North Haven, Conn.

Before
 HONORABLE JAMES H. WEBB,
 A Judge of the Superior Court,
 New Haven County,
 Jan. 3, 1918.

JUDGMENT

In the matter of the application of the Connecticut Company in the above entitled cause, dated December 29, 1917, and returnable before me as a Judge of the Superior Court on the third day of January, 1918, the parties, having been duly notified, appeared before me in the Superior Court Room in New Haven on said date and agreed upon.

Ernest Brockett, of North Haven, Conn.,
 William A. Wright of New Haven, Conn.,

and David B. Andrews, of North Haven, Conn., as the appraisers.

Wherefore, in accordance with the statutes in such cases made and provided, I appoint

Ernest Brockett,
 William A. Wright,

and David B. Andrews, appraisers to estimate the damage, if any, which may arise to said John S. Palmer from the taking and occupation of the land in the manner and form as limited in Docket No. 2604 of the Public Utilities Commission of the State of Connecticut, as more fully appears in said Docket, a copy of which is to this petition attached.

HONORABLE JAMES H. WEBB,
 A Judge of the Superior Court.

Exhibit IX—Appraisers' Return, Which Is Equivalent to a Judgment by the Court

In the Matter of the Application of
 THE CONNECTICUT COMPANY,
 a Railway Corporation, of
 New Haven, Conn.

vs.

JOHN S. PALMER,
 of North Haven, Conn.

Before
 HONORABLE JAMES H. WEBB,
 A Judge of the Superior Court,
 New Haven County,
 January, 1918.

RETURN OF APPRAISERS

To the Clerk of the Superior Court in and for the County of New Haven, Conn.

The undersigned, appointed Jan. 3, 1918, upon application of the Connecticut Company, by the Honorable James H. Webb, a Judge of the Superior Court, appraisers to estimate and assess all damages arising from the taking and occupation of certain lands, fully described in said application to John S. Palmer, the owner of said lands, respectfully report:

That they gave due notice to said John S. Palmer, and to the applicant, that they would meet for the purpose of their appointment on the nineteenth day of January, 1918, at the Superior Court House, in the City of New Haven, in said New Haven County, at ten o'clock in the forenoon, and on said day they met at the time and place named in their notice, and were duly sworn, and met said John S. Palmer and the applicant, who made appearance, and on said day they viewed the premises described in the application, and they fully heard said parties their witnesses and counsel, concerning the damages aforesaid.

That the lands taken and occupied by the applicant are contained in the land in the city and county of New Haven, State of Connecticut, and bounded and described as follows:

Southeast by Middletown Avenue; Southwest by land formerly of Albert Goodyear, now of Mary C. Rowe; Northwest by the Creek, and Northeast by land formerly of T. Forsie, now of Alice C. M. Cummings, containing four and one-half (4½) acres, more or less, being salt meadow, and the amount taken is limited as follows:

So much of said land as may be necessary for the erection and maintenance of a transmission line, together with the necessary supports, wires and fixtures, over, across and upon the land of said Palmer, the land necessary to be taken for this purpose not to exceed a total width of thirty feet (30 ft.), the same being fifteen feet (15 ft.) in width on either side of the center line of poles; and a right of way easement in said land twelve feet (12 ft.) in width and running in a westerly direction along the southerly boundary of said land, from said Middletown Avenue to that portion of the land hereinbefore referred

to as necessary to be taken for the erection and maintenance of said transmission line, all as shown on plan attached to the petition herein and entitled: "The Connecticut Company, New Haven Lines. Office of Construction Engineer. New Haven, Conn. New Haven-North Haven Transmission Line. Location across John S. Palmer, No. 3, 1917."

That said John S. Palmer appeared and claimed damages arising from the taking and occupation of said land as above described.

Wherefore, the said appraisers, having viewed said land and fully considered the evidence of said parties and their witnesses, and the claims and arguments of counsel, do estimate all damages arising to said John S. Palmer from the taking and occupation by the applicant, for the purposes set forth in said application, at one hundred dollars (\$100).

Dated at New Haven, Conn., this (?) day of January, 1918.

ERNEST BROCKETT }
WILLIAM A. WRIGHT } Appraisers.
DAVID B. ANDREWS }

Equipment and Design Features of Metropolitan District Cars

Improvements Over Cars of Older Design Include Use of 190-Hp. Tapped-Field Motors, Semi-Automatic Acceleration and More Compact Arrangement of Auxiliary Equipment

AN ARTICLE dealing with the new steel rolling stock received by the three railways operating London's rapid transit lines was printed in the March 5 issue of this paper. This dealt more particularly with their ability to permit rapid transfer of passengers as determined by the number and arrangement of doors. Also some attention was devoted to a general description, which included the layout of the seats, the replacement of straps with handrails and posts and interior fittings. Now more detailed information has been forthcoming relating to the general design and equipment features of the Metropolitan District Railway cars.

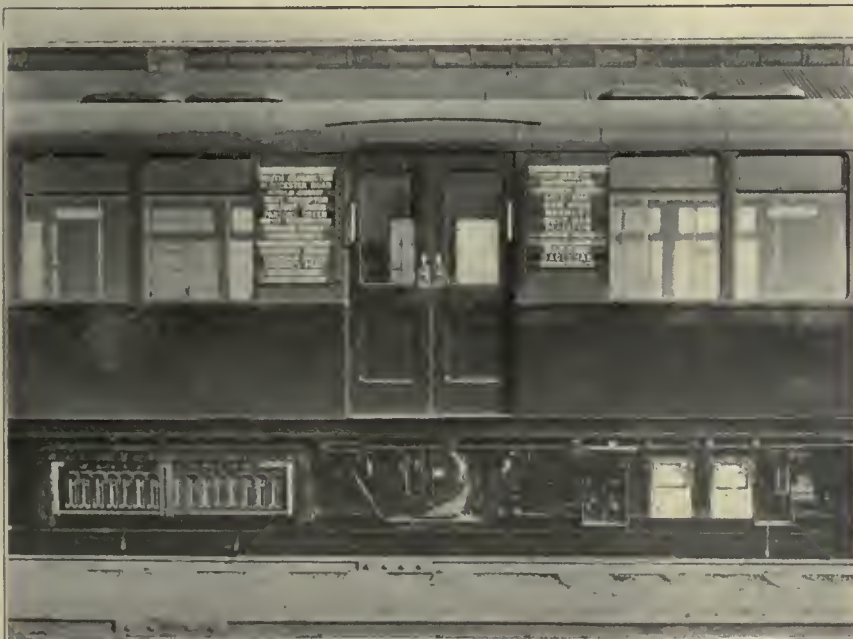
The first cars of the order, comprising 100, were put in service in February. During the first few days an eight-car train was stationed for a few hours at one of the busiest stations, with the view of letting the public familiarize itself with the improved rolling stock as a

concrete example of how Lord Ashfield was overcoming congestion difficulties in the underground railways. The train aroused a great deal of public and newspaper interest and comment.

The cars are 49 ft. long and 9½ ft. wide. Their height is about 12 ft. The motor cars weigh about 50 tons each, the control trailers 29 tons and the trailer cars 27.5 tons. The wheel base of the motor trucks is 7 ft. 10 in.

Much thought has been put into the electrical design, for that equipment embodies and co-ordinates the most modern apparatus. The motor cars are each equipped with four G. E. 260 motors, which are of the interpole tapped-field self-ventilating type. They are rated at 190 hp. for one hour and 182 amperes continuously. The motors are fitted with twenty-tooth pinions geared to sixty-three-tooth gears. The wheels are 36 in. in diameter. Each pair of motors with its control gear constitutes a complete unit equipment. The normal rate of acceleration will be 1½ m.p.h.p.s.

Substantial improvements have been made in the control apparatus. The contactor tips are provided with arcing horns and a molded arc chute. The interlocks are of the disk type, mounted on the back of the contactor.



RESISTORS, COMPRESSOR, ISOLATING SWITCH, MOTOR-FUSE BOX AND CIRCUIT BREAKER ARRANGED ON UNDERSIDE OF CAR



MOTORMAN'S CAB ON LEFT-HAND SIDE OF CAR—CONTROLLER COVER OFF

The contactor box with all its contactors, resistances, etc., is a unit complete with wiring and has its own terminal base. The reverser connected to the motor fields is of the drum type operated by a pair of opposed solenoid coils. The control is non-automatic except that the motor field is weakened automatically by the tapped-field relay when the current decreases as the last parallel point on the controller is reached.

The cars are equipped with Westinghouse clasp brakes of the standard type and are provided with automatic slack adjusters. Hand brakes are fitted to all motor cars and control trailers.

The underframes are constructed entirely of steel, bulb angles form the sole bars and the center longitudinals are rolled steel channels running the whole length of the frame. The cross bearers at the trucks are pressed channel sections. The floor plates are stiffened with short angles and pressings across from the sole bars to the center longitudinals.

The motor car truck side frames are channel sections running the whole length of 13 ft. to the headstocks, but are cut away on the bottom flange to receive the axle boxes. The bolsters are built up of 8 x 3 in. channels 5½ in. apart and stiffened with ½-in. plates.

The former arrangement of carrying the draft gear back to the kingpin has been abandoned and a short drawbar fixed to the longitudinal members is substituted. Tight couplings between cars is the result of the use of a central spring buffer through which the drawbar head passes.

Rules for Track Foremen

Eastern Massachusetts Gives Nine Suggestions to Help Them in Their Work

F. B. WALKER, engineer maintenance of way Eastern Massachusetts Street Railway, has got out the following nine suggestions for the track foreman on that system:

THINGS TO DO IF YOU ARE TO MAKE A SUCCESS IN 1921 ON YOUR DIVISIONS

1. Keep all tools and equipment properly repaired. Blaming your tools is a **POOR EXCUSE**.
2. Make requisitions and properly record all material used. Taking material without requisition is **THEFT**.
3. Secure approved authority for all work not current maintenance. This railway has to have **SOME SYSTEM**.
4. Know that proper equipment and tools and efficient men are on every job. Lack of these shows **POOR PLANNING**.
5. Concentrate on more extensive and better repairs to rail joints. Poor joints make **POOR TRACK** and high maintenance **COSTS**.
6. Weld as many joints as possible with due regard to costs. Welded joints are a substantial **ECONOMY**.
7. Drain your track at all seasons—**DIG, DITCH and DRAIN**. Bad drainage is a **CRIME**. Its penalty is **DEATH** to track and motors.
8. Reciprocate in use of tools and cars with other divisions. Because you are a **GENTLEMAN**.
9. Team work means **SUCCESS**. Secure this by having all your men know, so far as is consistent, the costs, plans and reasons for doing our work.

One-Man Departments Are to Be Avoided

Chamber of Commerce Meeting

Paper on Arrested Development of Public Utilities Presented by Edward N. Hurley at One General Session at the Annual Meeting Held at Atlantic City

THE annual meeting of the United States Chamber of Commerce, held last week at Atlantic City, concluded on April 29. On the evening of April 28 Secretary Herbert Hoover of the Department of Commerce presented an address. At the final meeting President Defrees was re-elected president.

The only paper directly related to public utilities was on their arrested development and was presented by Edward N. Hurley, formerly chairman United States Shipping Board and now with the Hurley Machine Company, Chicago, Ill. An abstract follows:

Arrested Development of Public Utilities*

BY EDWARD N. HURLEY

Formerly Chairman United States Shipping Board

AMERICA today is at the crossroads of electrical development. It is a question whether we are to go forward or stand still. At this very moment the electrical industry is suffering from arrested development. The industry is awaiting the verdict of the American people. We like to think of ourselves here in America as the pioneers in the science of electricity. We have been the pioneers, but the job we started has not been half done. There are still fourteen million homes in the United States without electric service and which eventually will have it. It is authentically stated that if the present problem of housing the population is to be met, the United States needs 1,500,000 additional homes, 500,000 additional factories, 5,000 public schools, 5,000 churches, 60,000 apartment buildings and 15,000 theaters. These, too, mean electric service. There are 150,000 pending applications for power by existing or new industrial plants desirous of utilizing electricity.

PROPER ENCOURAGEMENT NEEDED

If the proper encouragement is given to the electric light and power industry, the industry will spring forward in the next decade faster even than in the past decade. The result unquestionably will be a lowering of the cost of living and the conservation of national resources which cannot fail to benefit the whole population. I think it will be agreed that upon the development and application of electrical energy, more than upon any other one thing, are dependent both the speeding up of production and the conservation of our natural resources.

The financial standing of a well managed street railway, gas or electric lighting plant is as vital to the life and development of a community as its banks, and should be protected against unfair attacks so that customers and the investing public will have confidence in the properties, resulting in a desire to purchase utility securities when offered. The American people must realize that confidence in public utility securities cannot be had by constant, unjust criticism. If the same kind of public attack should be made upon national and state banks in the same communities where members of state commissions and other public officials are now bitterly assailing the central stations and street railway companies, the public would lose confidence and in a very

*Abstract of address presented at the annual meeting of the Chamber of Commerce of the United States, Atlantic City, N. J., April 29, 1921.

short period these banks would be forced to close their doors.

FINANCING FROM EARNINGS IMPOSSIBLE

No public utility corporation subject to regulation can finance its requirements out of earnings.

For every dollar of additional annual gross revenue from the sale of electric energy by a light and power company it is necessary to provide additional facilities involving an investment of from \$4 to \$6. Thus a company with a gross revenue of, say, \$1,000,000 per year, to provide for a growth of 10 per cent per annum (\$100,000), which is a very moderate rate, would have to spend \$400,000 to \$600,000 for additional generating capacity and distribution facilities. With earnings limited by commission regulation to 8 per cent on the invested property value, which is below the actual cost of obtaining capital, it will be readily seen that additional capital must be secured if the facilities are to be provided to enable the growing service requirements of the community to be met, and such capital can be obtained only if assured a reasonable, permanent return.

Therefore, adequate facilities for the transportation, lighting and industrial requirements of a growing community can be made available only if the attitude of the public and of the commission authorities toward the electric enterprise is such as to encourage the necessary capital investment and to afford it the security as to principal and return without which the investor will refuse to become interested in the situation.

When financing, companies are compelled to make provisions for ample reservations, so that today public utility securities with substantial reserves are gilt-edged.

We must use scales to weigh our local utility problems, and withhold public criticism until the real facts are thoroughly known. For instance, one particular case of snap judgment happened in connection with the National War Labor Board during the war. The employees of the street railway in a town of about 250,000 demanded an increased wage. The War Labor Board granted the increase without giving the management a chance to present its side of the case. The matter was later reviewed after the wages had been put in force. It was then found that the street railway company could not meet the increase awarded and the interest on its bonds. It was suggested that the company increase the rate of fare, but it developed that if the rate of fare was increased to meet this over-night increase in wages, the reduction in the number of passengers carried—in the number of people who would stop riding rather than pay this increased fare—would make it impossible for the company to meet its fixed charges. This hurried decision, in fact, placed the street railway corporation in such an embarrassing position that a readjustment of wages and conditions was necessary in order to permit the street railway to survive.

GOVERNMENT OWNERSHIP OR PRIVATE OWNERSHIP

Although at one time sympathetic toward government ownership, I am certain, after a number of years in government service, that no community can receive the industrial service to which it is entitled under municipal or governmental management. The cause for this fact lies in the human element. No city, state or national industrial enterprise can expect to obtain from management, or from men, an average of more than 50 per cent of personal efficiency, or more than 50 per cent of per-

sonal interest in their work, and it must be remembered that this percentage will gradually decrease the longer the individual manager or the individual employee is in this industrial government service.

I say again that it is not humanly possible to obtain the same effort or interest from managers or men employed in industrial government service that exists in competitive private ownership, and that as a result, if the advocates of government ownership investigate the facts carefully and impartially, they will find that government operation in industrial service is a flat failure from a "service to the public" standpoint. This is true not only in America but it is a proved fact throughout the world.

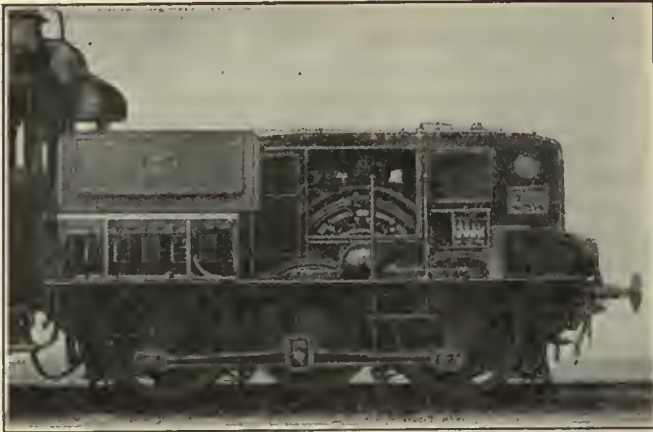
If the members of the Chamber of Commerce of the United States of America, with their great power and influence, were to take a keen personal interest in public utilities in their respective states, insisting that justice be given the public and the utilities, a permanent step toward solving this most important problem would be taken.

Swiss Comment on American Electric Locomotives

IN A RECENT issue of *Schweizerische Bauzeitung*, A. Laternser, an engineer of Zurich, Switzerland, compares the qualities of a number of electric locomotives. These, with the conventional designations used abroad,* were as follows: General Electric freight locomotive for Milwaukee Railway (2B + B + B + B2) direct current; General Electric express passenger locomotive for Milwaukee Railway (1B + D + D + B1), direct current; Westinghouse freight locomotive for Pennsylvania Railroad (1C + C1), alternating current; Westinghouse express passenger locomotive for Milwaukee Railway (2C1 + 1C2), direct current; Oerlikon freight locomotive for Swiss Federal Railway (1C + C1), alternating current; Oerlikon express passenger locomotive for Italian State Railways (2C2), three-phase.

Comparing the geared and gearless types, Mr. Laternser disapproves of the latter on account of the low center of gravity and the former on account of the decreasing gear efficiency with increase in speed. He also objects to the large unsprung load in all three types of Milwaukee locomotives mentioned, stating that this produces excessive wear of rails, and calls attention to the fact that the two leading American firms building electric locomotives are not agreed as to the best construction for express passenger and freight types of heavy locomotives. It seems strange to him that both the General Electric Company and the Westinghouse company have had such excellent results with their respective types of construction. He considers the American designs for regeneration to be complicated and not fully reliable, and the whole design of electrical equipment of American locomotives to be more complicated than that of the Swiss Federal type. The two Oerlikon locomotives mentioned are the most powerful yet built for use abroad and are both equipped for regenerative braking.

*The wheel arrangement of locomotives is designated thus: Beginning at the front end of the locomotive the number of pony axles is designated by a number, then the number of driving axles on the successive trucks by letters, A representing one driving axle, B two axles, C three axles, etc., a final number being used to indicate the number of pony axles at the rear. If there are any intermediate pony axles their number and position are indicated by numbers properly placed in the symbol.



EXPERIMENTAL ELECTRIC TRACTOR FOR USE ON
BERLIN RAPID TRANSIT LINES



EXPERIMENTAL MULTIPLE UNIT TRAINS IN OPERATION
IN BERLIN DURING PAST FEW MONTHS

Novel Electric Train Drive in Berlin

Experiments Indicate Superiority of Multiple-Unit Over Locomotive Operation in This Service—Ingenious Application of Electric Tractor Principle Suggests Early Days in This Country

IN THE article by E. C. Zehme appearing in the issue of the *ELECTRIC RAILWAY JOURNAL* for March 5, 1921, page 438, mention was made of some experiments in Berlin with rapid-transit trains. In a recent issue of the *Zeitschrift des Vereines deutsches Ingenieure* considerable detail is given of the experimental multiple-unit train which is in use, and also of the small electric tractors.

Referring first to the tractor, which is of noticeably low construction (being less than 5 ft. high), it is of interest to note that a complete suburban train, consisting of twelve coaches, has been propelled by two of these tractors, one each front and rear, controlled from the front platform of the first coach. The tractor draws current from a pantograph mounted on the roof of the first coach.

The tractors contain each a single-phase commutator motor of 600 hp., hourly rating, or 580 hp., continuous rating, with forced air cooling. This drives a jackshaft through a reduction gear with a ratio of 1 to 3.54, and the jackshaft is in turn rod-coupled to the two driving axles. The framework of the tractor is made up largely of cast steel, the lower part of the motor being part of the casting.

Directly above one of the axles is mounted the main transformer, of 650-kva. hourly rating. It is of the air blast type. About one-sixth of the transformer output is required for train heating. A 15-kw. fan provides forced circulation for transformer and motor. On the other side of the motor, and above the second axle, is located an air compressor for operation of brakes, oil switch, pantograph and rail sanders. Nine taps on the low-voltage winding of the transformer, two choke coils and two small resistors provide for twelve positions of the controller.

The wheelbase of the tractor is 9½ ft., the wheel diameter 4 ft. 5 in., the complete weight about 75,000 lb., the "unsprung" load 11,500 lb., the maximum speed 40½ m.p.h., the maximum speed of the motor 900 r.p.m., and the drawbar pull at the start 21,200 lb.

The tractor or locomotive plan for operating rapid transit trains in Berlin is, of course, highly experimental. It is doubtful if the rate of acceleration which can be produced with this arrangement is sufficient for

local conditions. Another experiment which has been tried within the past few months is the use of motor cars and trailers, each motor car having an hourly rating of about 350 hp. and weighing completely equipped about 68 tons. The experimental train which has been in successful operation during the past winter consists of two motor cars and three trailers.

A Small Single-Phase Locomotive for Use at Mare Island

THE San Francisco, Napa & Calistoga Railway has just completed in its shops at Napa a 50-ton single-phase locomotive. It is to be used to handle government freight between the company's connection at Napa Junction with the Southern Pacific Company and the government's delivery yards at the Mare Island Navy Yard. Mare Island was recently connected with the main land by a causeway built by the government and electrified by the railway.

This locomotive, which was built especially for this service, has an over-all length of 35 ft. and a width of 9 ft. 6 in. The cab itself is 26 ft. long and at each end is a 30-in. platform. It is equipped with four Westinghouse 132-A motors mounted on heavy Baldwin trucks. Westinghouse AMM brake equipment is installed. The motors are geared with a ratio of 16 to 67 to the 34-in. steel-tired wheels. The locomotive takes its power from the 3,300-volt, 25-cycle line through a sliding pantograph trolley. A 250-kw. transformer fed through an auto-



THE 50-TON SINGLE-PHASE LOCOMOTIVE USED ON THE
MARE ISLAND CAUSEWAY

matic oil circuit breaker provides suitable secondary voltage through the usual combination of switch groups and preventive coils.

The steel underframe for this locomotive is made in one piece. This single casting, weighing 7 tons, has 13-in. center sills and 10-in. side sills. Buffer plates of $\frac{3}{4}$ -in. boiler iron were riveted around the ends, dropping low enough in the center to carry the pilot and extending around the sides a distance of 30 in. beneath the ends of the cab. Standard A.R.E.A. engine pocket couplers with 3-in. pins are attached through these plates to the steel end sill which forms a part of the underframe casting. The floor space provided for the equipment is 4 ft. x 18 ft. A structure of 3-in. x 3-in. angles with eight posts and suitable screens forms a cage for the inclosure of all apparatus.

Ammeters are placed in the engineer's cab and an Economy wattmeter is provided on the high tension side of the transformer for metering the total energy consumed.

The locomotive is owned jointly by the San Francisco, Napa & Calistoga Railway and the Sacramento Northern Railway.

George A. Hearn, superintendent of equipment, was the designing and construction engineer.

W., B. & A. Has New Terminal in Washington

AS ANNOUNCED in the news columns of this paper for March 19, 1921, the Washington, Baltimore & Annapolis Electric Railroad has begun the use of its new terminal in Washington, D. C. The terminal is located but three blocks from the Treasury Building. The railway purchased approximately one-half of the



© Harris & Ewing, Washington, D. C.

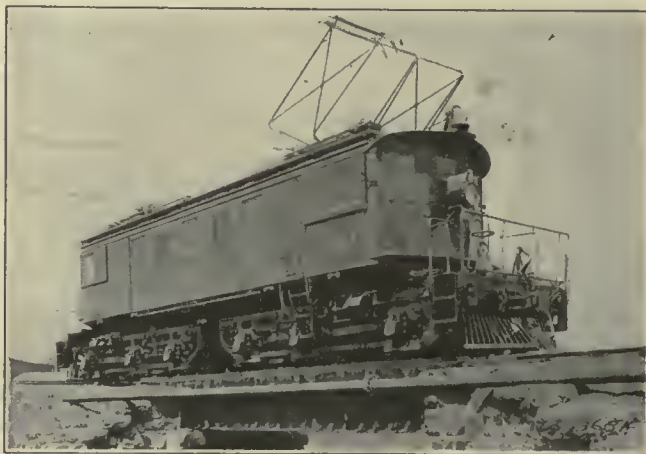
TAKE ELECTRIC TRAIN HERE FOR BALTIMORE

city block bounded by New York Avenue, Twelfth, Thirteenth and Eighteenth Streets, N. W., laid three new 200-ft. tracks into this yard and constructed new loading platforms. Buildings which were previously on the site have been utilized for waiting room, ticket office and news-stand and also with numerous offices on the upper floors.

Previous to the construction of this terminal the cars came up only as far as Fifteenth Street on New York Avenue, and loading was done from the street at these locations. The crowds waiting for cars in the streets led to such an interruption of traffic that protests were constantly being made and there were also general objections on the part of the public to the practice of loading these large interurban cars from the street. The new special trackwork was furnished by the Lorain Steel Company.

Paulista Locomotive Ready for Delivery

THE first Baldwin-Westinghouse freight locomotive for the Paulista (Brazil) Railway has been completed and tested. The passenger locomotives are nearing completion. The initial service on the double-track line between Jundiahy and Campiñas, a route-mileage of 28, will be furnished with eight freight locomotives



BALDWIN-WESTINGHOUSE 3,000-VOLT DIRECT-CURRENT FREIGHT LOCOMOTIVE FOR PAULISTA RAILWAY

and four passenger machines. Orders for two of each type were obtained by the Westinghouse Electric & Manufacturing Company. The remaining eight locomotives are being built by the General Electric Company.

This electrification marks a milestone in the broad application of the natural resources of Brazil through the replacement of imported coal for power development. These locomotives are to be used in main-line freight service on the Paulista Railway, which is the main broad-gage trunk line of the most prosperous and productive part of the State of São Paulo.

This type locomotive weighs 105 metric tons (231,000 lb.) and has six driving axles each equipped with one 280-hp. direct-current motor. The motors are arranged for operation with two in series on the 3,000-volt line. Each locomotive is designed to handle trailing loads up to 770 tons over a line having a maximum grade of approximately 2 per cent. It is equipped with M.C.B. couplers for testing purposes, which will later be replaced with Continental draft gear. Also vacuum train brakes will replace the temporary pressure brake.

Enormous quantities of coffee, beans, rice, cereals and cattle are transported over this line by thoroughly modern and efficient railroading methods. Electrification is the latest step in the growth and progress of this notable railway, which is one of the most important lines in all South America.

The Denver & Interurban Railroad, Denver, Col., is planning to span South Boulder Canyon at Eldorado Springs with a suspension foot bridge. This canyon is one of the most picturesque chasms of Colorado and the new bridge will afford a wonderful view of the mountain scenery. The cliffs rise above the water of South Boulder Creek more than 1,000 ft. on the north side. On the south side of the canyon Castle Rock Cliff is a precipice of only 650 ft., so the bridge will be suspended in the air about 600 ft. because of the topography of the cleft forming the gateway. The company expects to go ahead with the proposition as soon as financial conditions will permit.

Electric Locomotive Characteristics

Engineer of Manufacturing Company Discusses Qualities of the Several Types of Locomotive Available and Outlines the Well-Known Advantages of Electric Motive Power

ON APRIL 14 N. W. Storer, of the general engineering department of the Westinghouse Electric & Manufacturing Company, read a paper before the electrical section of the Franklin Institute, Philadelphia. With the aid of a large number of lantern slides he showed how the electrical and other characteristics of different types of electric locomotives compare among themselves and with the characteristics of the steam locomotive. The accompanying set of curves was one of the series which he showed.

Mr. Storer discussed his topic under a number of different heads, listing thus the salient features of the electric locomotive and accompanying the summary with comments and illustrations. The principal points which he made were briefly as follows:

With the electric locomotive the power that can be applied to a train is in no way limited by the size of the individual motive-power unit. Theoretically the locomotive can draw the maximum amount of power that can be utilized at one point in the train.

With the electric locomotive the length of the operating division of a railroad is no longer limited by the locomotive. A record for a continuous twenty-four-hour run of 766 miles has been reached by passenger locomotives on the Chicago, Milwaukee & St. Paul. Electrification permits radical changes in terminals, due partly to the absence of smoke, dirt and noise and very greatly to the application of multiple-unit car equipment for the suburban traffic. The advantages in the use of the electric locomotive for long tunnels is obvious.

Electrification involves conservation in fuel.

Due to the greater capacity which can be secured from the locomotive unit, electrification results in greater effectiveness of labor.

Increased reliability of motive power is also an important feature of electrification.

The characteristics of the electric locomotive that make it so desirable may be summarized thus: Its maximum tractive effort is from two to four times its normal continuous running tractive effort. Due to the fact that the capacity of the electric locomotive is limited by the heating of the motors, it can easily develop considerably more power in cold weather than warm. Practically all of the wearing parts of the electric locomotive have normally a long life.

Mr. Storer then discussed the characteristics of the several types of electric locomotives. He said that the characteristics of the direct-current locomotive are especially suited for railway service, since the speed curve falls rapidly as the tractive effort increases. The alter-

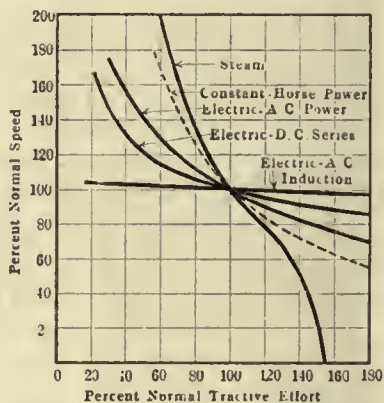
nating-current locomotive does not have the ability to produce the high starting torques which are possible with the direct-current locomotive, but on the other hand the speed control is more easily and efficiently obtained by voltage variation. The induction-motor locomotive utilizes the constant speed characteristics of the induction motor. This motor is capable of producing very heavy starting torques and of carrying heavy load, but on heavy loads the speed is maintained at practically constant value and the power required increases practically in proportion to the tractive effort. It is necessary, therefore, to have a motor of greater capacity than with the series motor to take care of peak load. Regenerative braking may be obtained with any of the three classes of locomotives. It should be applied on locomotives which are to be operated over heavy grades, but for level or light grade sections the advantage will hardly be worth the complication.

Wheel Welding in Terre Haute

FOR two and one-half years M. M. Nash, superintendent of railways and master mechanic of the Terre Haute Division, Terre Haute, Indianapolis & Eastern Traction Company, has been making extensive use of the resistance type of electric welder in reclaiming all manner of car equipment, including interurban car wheels and axles. During this period 2,500,000 interurban car-miles have been operated on the division and only one set of eight wheels has been replaced for flange wear. On all other wheels thin flanges and wheels otherwise worn have been built up and corrected by welding without removing them from the car. Not only have flanges been welded but they have been re-welded, and some of them have mileage records approaching 200,000 miles. These wheels are put out on the road in fairly fast interurban service just as the welders leave them, without any smoothing up, as the company has no wheel lathe in the Terre Haute shop. In exceptional cases a wheel-truing brakeshoe is used for a short time. Mr. Nash says the wheels are sometimes a little noisy when they are first put out on the road, but the rough surface soon smoothes out and he claims he has never had a derailment or flange breakage, more than a small chip, as the result of the welding work. "Railox" electrodes are used for welding the wheel flanges. Where a chip breaks out of the flange it is filled in again, but the projection of the new metal is not smoothed off. This takes care of itself.

A further step recently devised to prolong the life of a pair of wheels, in the absence of a lathe, is the burning off with an acetylene torch of the second flange which sometimes develops on the tread of a wheel. After this burning process is completed no attempt is made to smooth up the tread. The tread and flange are merely permitted to wear smooth in service.

The new Materials Handling Division of the American Society of Mechanical Engineers is planning sessions for the discussion of design and construction of machinery for road building, at the society's spring meeting, to be held at the Congress Hotel, Chicago, May 23 to 26. Four papers will treat this problem from the viewpoint of the contractor, the road builder, and possible future development of mechanical equipment in road building. The work of this division, whose membership is rapidly approaching one thousand, is now well under way.



CURVE SHOWING SPEED-TRACTIVE EFFORT CHARACTERISTICS FOR STEAM AND ELECTRIC LOCOMOTIVES

Removable Tower Used for Making Overhead Repairs



REMOVABLE TOWER IN USE

a low truck to facilitate its being moved about and the overhead railing was removed to provide necessary clearance.

One Way to Enlarge Oil Boxes

THE disadvantage of the small oil box on the frames of old motors such as the GE-57 has, of course, been recognized for a long time and many ways of enlarging these have been tried.

The Little Rock (Ark.) Railway & Electric Company has some of these motors and has found a novel and satisfactory way of enlarging the oil boxes. Sections of old boiler tubes 4 or 5 in. long, $3\frac{1}{2}$ in. in diameter, are first squared up and made to fit the opening of the box on the motor frame. The section of pipe is then welded to the motor frame, thus adding considerable capacity to the oil box. A cover, retained with a spring, is then put on top of the section of pipe. This work was started with the use of the two Indianapolis welders which the company has for doing trackwork.



GE-57 MOTOR FRAME WITH SQUARED SECTIONS OF $3\frac{1}{2}$ -IN. PIPE WELDED TO ENLARGE OIL BOXES

Recently a Wilson motor-generator set was added. This is now used for most of the work in the shop and also for bonding, and the Indianapolis welders are being used for trackwork. In an accompanying illustration is shown a GE-57 motor frame with the enlarged oil box.

Reclaiming a Cast-Steel Mate

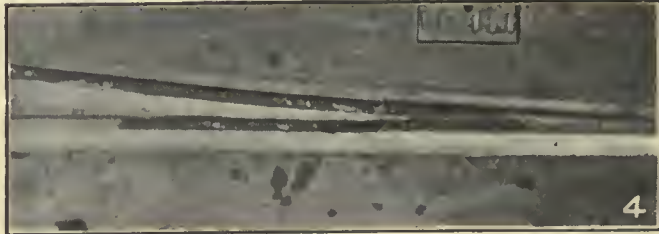
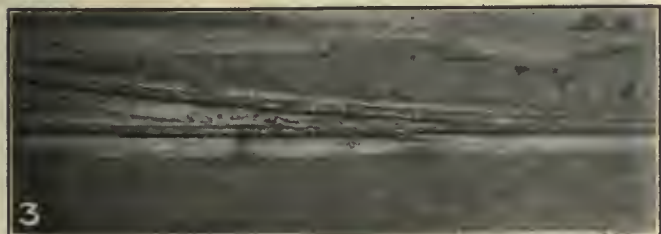
FOUR accompanying pictures illustrate the success which is being obtained in the track department of the Dallas Railway under the direction of B. R. Brown, engineer maintenance of way and overhead construction, in reclaiming bad special trackwork. The particular job pictured shows a cast-steel mate in which a hole was broken down through the casting. The hole was filled up with slugs of iron and soft metal was fused into a solid mass to support the surface welding.

The mate was then built up by means of a hard steel electrode known as the A-steel of the Indianapolis Switch & Frog Company. The plane surface was properly finished by means of a reciprocating grinder and an Atlas rotary grinder was used for shaping up the point and flangeways. This job was done in forty hours by a welder and helper. After being in service for a period of six months the mate showed no signs of deterioration.

Very good success has also been had in welding solid manganese railroad crossings when in extremely bad condition. Mr. Brown says that the secret of this work lies in the mechanic who does the job and that it is simply a matter of knowledge as to how best to handle the metal.



NO. 1—HOLE BROKEN THROUGH CAST-STEEL MATE IN DALLAS. NO. 2—APPEARANCE AFTER HOLE HAD BEEN FILLED WITH SOFT METAL. NO. 3—APPEARANCE AFTER THE MATE POINT HAD BEEN FORMED AND WELDING COMPLETED. NO. 4—THE COMPLETED JOB AFTER GRINDING

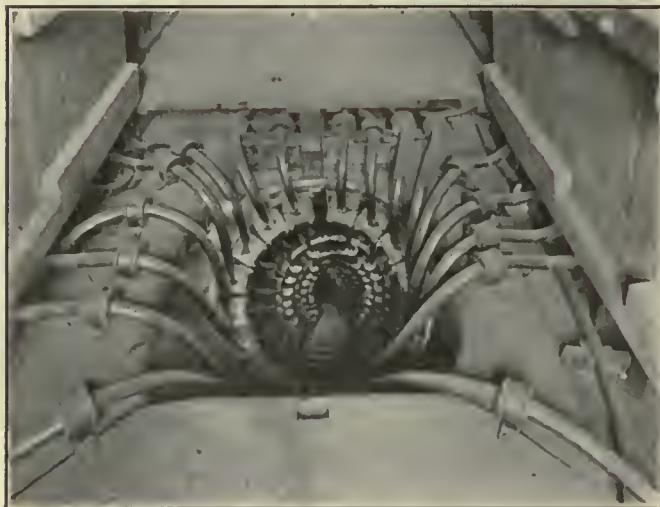


Painting Under Difficulties

Inside of Submarine Pipe Had to Be Painted by Workers in Pipe Using an Air Spray Brush—Work Done at Night, When Power Was Off

PAINTING the inside of a pipe 36 in. in diameter and more than 340 ft. long is a job to be avoided rather than sought, is the probable opinion of the two operators who recently completed such a job for the Connecticut Company at Bridgeport.

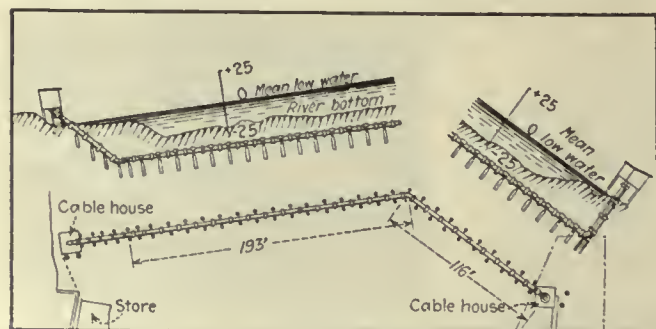
In order to get its feeder cables across the Pequon-



LOOKING DOWN INTO WEST END OF PIPE, SHOWING CABLES MOUNTED ON INSULATORS

nock River at Bridgeport the Connecticut Company in 1906 laid down this 36-in. pipe, as shown in an accompanying illustration. At that time nine 750,000-circ.-mil lead-covered cables were installed, just laying them in the pipe. In 1913 eight 1,000,000-circ.-mil cables were added, and at that time, in order to arrange the cables more satisfactorily in the pipe, they were placed on insulating brackets, as shown in another accompanying illustration. The third illustration shows a view looking down into the top of the 45-deg. section of pipe on the west side of the river.

It was found a few months ago that the inside of the pipe was corroding badly and it was decided to paint it. On account of the fact that it was desired to have the cables remain insulated from the pipe itself it was necessary to use an insulating paint.



SKETCH OF FEEDER CABLE PIPE INSTALLATION, SHOWING RELATION TO RIVER

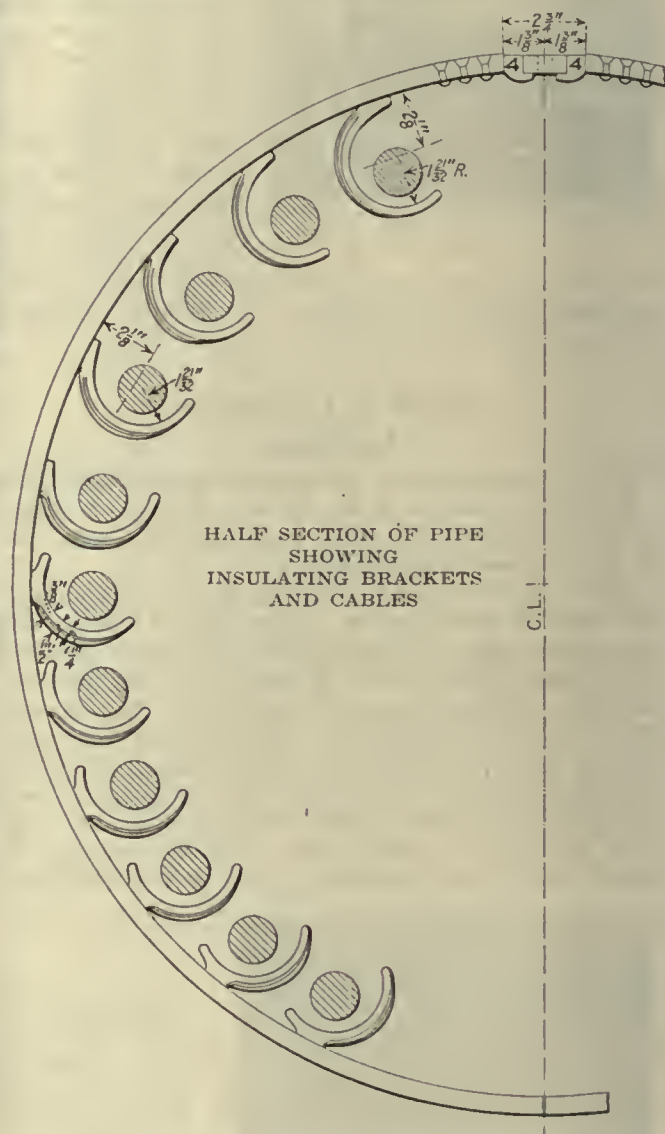
The paint was thinned with gasoline and applied with an air spray brush. The work was done by two men, working four hours at a time at night, when the power was off; they progressed about 45 ft. per night.

When the men approached the point where the ver-

tical section of pipe meets that section which goes directly under the river, which is the lowest point on the whole system, the men were overcome by the gasoline fumes, it having been found impossible to force air through the pipe satisfactorily. After a day or two of rest, they tried it again and were a second time overcome. Strenuous efforts to ventilate the pipe were made, and finally a suction fan was installed, which gave sufficient circulation to allow the men to work in the pipe satisfactorily and finish the job.

About 120 gal. of Sterling insulating paint were used to complete the job.

An interesting sidelight on this installation is that after these cables were installed on the insulating brackets a workman felt a shock, and, upon test, a string of five lamps in series were lighted to full bril-



liancy between the cable sheath and ground. All such tests were made for a period of a minute or more, each time, and no explanation could be found. Finally, one string of lights was left on for several minutes, and it was noted that after about two minutes the lights went out. This was found always to be the case, as the test was applied to other cables, and it was finally decided that there was enough static charge in the cable sheath to maintain this current for that length of time. Accordingly, all cable sheaths were grounded, through 2-amp. fuses, and no trouble has been noted.

Association News

National Electric Railway Day

THE association's advertising section for the committee on publicity reports that the success of the National Electric Railway Day idea far exceeded their anticipations. Much publicity for the industry attended the demonstrations both in the papers and by the film service weeklies. Where there were no demonstrations local papers gave considerable space to stories pertaining to the development of the local traction company.

Of the demonstrations marking the day that of Richmond, Va., the home of the electric railway, is probably the most striking. After several weeks' search the body of one of the cars used on the original electrified line was unearthed, fitted with new trucks and, with the Mayor and other city officials as escorts, was paraded over the streets used by the original route.

Other demonstrations of importance were held in Minneapolis and St. Paul. Here horse car No. 1, which was first put in service in St. Paul on July 17, 1872, was driven through the business section of both cities by the employees who formerly used the car in their daily runs. A score or more persons who also used the car when it was in service again rode as passengers. The trainmen's band led the demonstration, which also showed the growth of the cars used on that system.

Many of the various news film service companies as well as national still life photographers were busy in each of these places obtaining pictures for showing all over the country in the topical news weeklies.

In New Bedford there was also a unique demonstration. The company got out one of the old horse cars and in order to arouse enthusiasm on the part of the public offered a year's free transportation to the oldest person riding on the car. It is understood that there were more than a dozen competitors, the oldest one of whom was 82. The Boston papers gave considerable space to the event.

The papers also took hold of the news features and in many cities a considerable amount of space was given over to the history and development of the local traction company. A particularly good story concerning Reading, Pa., was printed in the local papers. The Eastern Pennsylvania Railways made wide use of the folders and other publicity sent out by the association.

The association's department of publicity has asked the various railways to send clippings and photographs showing what was actually done in their community not merely as a matter of record but for use in helping others to put over similar ideas at a later day.

Car Design Committee at Work

APPOINTMENT by President Gove of the committee of the American Electric Railway Engineering Association authorized at the last convention for the purpose of developing "anticipatory standards" of car design has been made. Under the direction of the chairman, H. H. Adams, superintendent of equipment Chicago Surface Lines, the work of this committee is already well under way. The rest of the personnel of the committee is equally divided between representatives of the car

builders and railway companies, as follows: H. A. Benedict, mechanical engineer Public Service Railway, Newark, N. J.; J. A. Brooks, chief draftsman the J. G. Brill Company, Philadelphia, Pa.; J. W. Hulme, superintendent of equipment International Railways, Buffalo, N. Y.; G. L. Kippenberger, assistant to vice-president St. Louis Car Company, St. Louis, Mo.; John Lindall, superintendent rolling stock and shops Boston Elevated Railway; V. R. Willoughby, assistant general mechanical engineer American Car & Foundry Company, New York.

In a recent interview, Mr. Adams summed up the objects of the committee as being "to develop uniformity of car design out of the chaotic conditions existing at present, and ultimately leading up to the question of standardization." The committee has started out on its work by proceeding to gather information and data covering present practices in car design, limiting itself at first to a study of double-truck closed city car construction. To this end, Mr. Adams prepared a questionnaire which was sent to the members of the committee only, and which will bring back data to the chairman from which a comprehensive compilation of car dimensions can be made and analyzed and summarized. Through the very generous co-operation of the car builders represented on the committee, it will be possible readily to secure accurate data on a wide range of car designs built during the last five years, without having to call upon the railway companies.

After these data are compiled, Mr. Adams plans to call the committee together to make a study of the situation and endeavor to arrive at certain uniform dimensions to be embodied in car design, such as post centers, height and widths of body, side and roof dimensioning and construction, window sizes, seat dimensions and numerous elemental parts. Mr. Adams is of the opinion that it should be readily possible to bring about such uniformity in these details of design that cars of varying lengths can be made by simply adding or subtracting standard sections. Whether a car is of the double-end, center-entrance or Peter Witt type does not enter into the consideration, for each of these types could be built with a large part of the car body made up of the uniform sections.

C. E. R. A. Committees Announced

PRESIDENT A. C. Blinn of the Central Electric Railway Association has announced the following committee appointments for the current year:

Auditing.—Walter Shroyer, chairman, Anderson, Ind.; L. T. Hixon, Indianapolis, Ind.; E. O. Reed, Lima, Ohio.

Annual Transportation.—Bert Weedon, chairman, Indianapolis, Ind.; C. J. Laney, Akron, Ohio; J. F. Starkey, Sandusky, Ohio; W. S. Rodger, Detroit, Mich.; C. O. Sullivan, Lima, Ohio.

Constitution and By-Laws.—Arthur W. Brady, chairman, Anderson, Ind.; Charles L. Henry, Indianapolis, Ind.; F. W. Coen, Sandusky, Ohio; Frank R. Coates, Toledo, Ohio; E. F. Schneider, Cleveland, Ohio.

Finance.—James P. Barnes, chairman, Louisville, Ky.; T. A. Ferneding, Dayton, Ohio; F. R. Coates, Toledo, Ohio; F. W. Coen, Sandusky, Ohio.

Hotel and Arrangements.—S. D. Hutchins, Westinghouse Traction Brake Co., chairman; Harry L. Brown, ELECTRIC RAILWAY JOURNAL; John Benham, International Register Co.; L. E. Gould, Economy Electric Devices Co.; C. Dorticus, General Electric Co.

National Safety Council.—Harry A. Nicholl, chairman, Anderson, Ind.; J. W. Giltner, Akron, Ohio; R. A. Crume, Dayton, Ohio; A. Swartz, Toledo, Ohio.

Publicity.—Harry L. Brown, *ELECTRIC RAILWAY JOURNAL*, chairman; H. J. Kenfield, *Electric Traction*; C. J. Laney, Akron, Ohio.

Resolutions.—Robert I. Todd, chairman, Indianapolis, Ind.; Garrett T. Seely, Youngstown, Ohio; Samuel W. Greenland, Fort Wayne, Ind.

Rules Governing Interchange of Equipment.—John F. Collins, chairman, Jackson, Mich.; F. R. Coates, Toledo, Ohio; F. W. Coen, Sandusky, Ohio; G. B. Dobbin, Akron, Ohio; Harry Reid, Indianapolis, Ind.

Education and Training of Employees.—James P. Barnes, chairman, Louisville, Ky.; H. C. DeCamp, Westinghouse Electric & Manufacturing Co.; Edwin M. Walker, Terre Haute, Ind.

Standardization and Bureau of Standards.—H. H. Buckman, chairman, Scottsburg, Ind.; P. V. C. See, Akron, Ohio; J. W. Osborne, Lebanon, Ind.; G. H. Kelsay, Elyria, Ohio; John H. Holl, Louisville, Ky.; M. F. Skouden, Anderson, Ind.; Charles Ellis, Cincinnati Car Co.; K. D. Leavitt, Dayton, Ohio; R. C. Taylor, Taylorville, Albion, Mich.

Uniform Changes for Repairs to Interchanged Equipment.—F. W. Coen, chairman, Sandusky, Ohio; J. W. Glendenning, Jackson, Mich.; Harry Reid, Indianapolis, Ind.

Program.—Samuel W. Greenland, chairman, Fort Wayne, Ind.; F. D. Carpenter, Lima, Ohio; H. A. Nicholl, Anderson, Ind.; L. G. Parker, Cleveland Frog & Crossing Co.; H. C. DeCamp, Westinghouse Electric & Manufacturing Co.

Transportation.—Harry Reid, chairman, Indianapolis, Ind.; C. J. Laney, Akron, Ohio; J. F. Starkey, Sandusky, Ohio; W. S. Rodger, Detroit, Mich.; Bert Weedon, Indianapolis, Ind.

Electric Railway Express.—C. J. Laney, chairman, Akron, Ohio; W. S. Rodger, Detroit, Mich.; J. F. Starkey, Sandusky, Ohio; G. K. Jefferies, Indianapolis, Ind.; H. A. Nicholl, Anderson, Ind.

Suppliers.—E. C. Folsom, Railway Materials Co.; C. B. Arthur, Universal Lubricating Co.; W. D. Hamer, W. D. Hamer Co.; Nic LeGrand, National Safety Car & Equipment Co.; H. C. DeCamp, Westinghouse Electric & Manufacturing Co.; C. F. Wickwire, Ohio Brass Co.; L. G. Parker, Cleveland Frog & Crossing Co.; C. Dorticus, General Electric Co.; Myles B. Lambert, Westinghouse Electric & Manufacturing Co.; J. E. McLain, Trolley Supply Co.; James H. Drew, Drew Electric & Manufacturing Co.; F. N. Root, Root Spring Scraper Co.

Track and Roadway.—F. R. H. Daniels, chairman, Indianapolis, Ind.; T. H. Sundmaker, Springfield, Ohio; L. A. Mitchell, Anderson, Ind.; A. V. Brown, Sandusky, Ohio; H. D. Sanderson, Jackson, Mich.; E. D. Eckroad, Akron, Ohio.

These Ties Have Long Life

SOME facts regarding track laid with cedar ties in 1869 by the Chicago, Milwaukee & St. Paul Railroad were recently reported by the railway maintenance engineer. After fifty-two years about 2,000 of the original ties, or 15 per cent, are still in the track. The ties are in a stretch of 14 miles between North Milwaukee and Cedarburg. During the period mentioned the track has been relaid with several sections of rail, and the ties have also undergone one shifting and shortening.

Auto Transportation in California

**Motor Truck and Bus Must Get Permission to Operate for Hire Over the State's Improved Highways—
A Veritable Network of Auto Lines**

A MARKED feature of the work of the California Railroad Commission during the year ended June 30, 1920, according to the commission's report, resulted from the development of the state's youngest utility—transportation by motor truck and stage. Given impetus during the war by the demand for added transportation facilities, the auto, both freight and passenger carrying, developed rapidly as a common carrier. California's wonderful road system lent itself to this development. Today the state is served by a veritable network of auto lines, and the demand for operating permits is ever increasing. The extent of this type of service is indicated by the number of certificates issued by the commission. There are about 900 legally established operative rights on file.

The usual mistakes have been made during the course of its development prior to the time jurisdiction was vested in the commission. Inexperienced persons, armed only with a desire to enter the auto traffic field, without any knowledge of the dangers that lurk in all new businesses, without training to fit them for conducting a transportation utility (except ability to drive a truck or car), took advantage of the fact that there was need for additional carriers and entered the lists. The number of transfers of permits authorized by the commission shows better than anything else the fate of the pioneers. Exigencies of the rapidly growing service, resulting from financial needs and traffic demands, which they could not meet, forced them to dispose of their routes. This later development, under the extended jurisdiction of the commission, has been carefully guided. Today the auto transportation field is receiving the most careful attention. Haphazard operation is not possible; permits are issued only on a showing that public convenience and necessity require additional transportation facilities in the district sought to be served. There has been established by this commission a high standard of service by auto carriers, maintained through a system of inspection, that insures for the traveling and shipping public a maximum of safety and comfort and efficiency. Rules and regulations have been designed by the commission for the guidance and control of the public patronized auto, and their enforcement, in the opinion of the commission, will ultimately result in the high standard of service sought.

One of the reasons for this auto transportation development is that in the last nine years the counties of California have spent more than \$125,000,000 on highway development. In this time the state has also spent \$50,000,000, so that now there is said to be in California five times the mileage of hard surface roads that exist in any other state. The climate is conducive to all-year-round automobile travel and electric railways must concede that these two things are bound to increase automotive competition.

Competition, however, is not altogether an urban proposition, for it is possible to travel from San Francisco to Los Angeles, a distance of more than 500 miles, by auto bus. All motor buses operating outside the city limits come under the jurisdiction of the Railroad Commission.

Recent Happenings in Great Britain

From Our Regular Correspondent

Increasing attention attaches in England to the trackless trolley because of the general need for economy and the desire to make haste slowly with respect to expenditures for new undertakings. In London, on the other hand, the co-ordination plan for the transit lines appears to be off for the present. The news, however, all points to the spirit of caution with which changes of all kinds are being approached.

FROM several parts of Great Britain comes evidence of a pending development of the use of the trackless trolley system. For a number of years a few installations of this system have been in successful use in England, but hitherto it has not been largely adopted. Before the war tramway track construction as well as labor were comparatively cheap, so that a tramway could meet expenses though the traffic was not very heavy. The railless car was accordingly used on routes where traffic was really light.

Even in districts of that sort some traction authorities preferred the petrol motor omnibus, partly because it is not confined to fixed routes of travel and partly because there is no initial expenditure on providing and erecting poles and overhead wires. There is also the fact that in many cases Parliamentary powers are necessary to authorize the poles and wires, while, except in the case where a local authority is the operator, no Parliamentary sanction is required to run petrol omnibuses.

TRACKLESS CAR COSTS LOW

All along, however, the trackless electric car could be worked at a lower cost per mile run than the automobile bus, and since the war this difference has been accentuated owing to the fact that the price of petrol has gone up more than the price of electricity.

Some tramway authorities—indeed probably a good many of them—possess Parliamentary powers to construct extensions which have not been carried out owing to the prohibitive cost of track construction. Other tramway undertakings would no doubt during the last two years have sought powers for extensions, but have refrained for the same reason. Most of the contemplated lines would be on suburban routes of light or medium traffic. To meet this case, therefore, the trackless trolley system is having a favorable eye turned on it.

In Bradford especially there is much prospective activity in this direction. There is the drawback that it seems to a local authority even if engaged in working tramways cannot work trackless cars without getting specific Parliamentary authority. Even if this is so, the difficulty is far from insuperable. So far, however, as Bradford is concerned, the powers now exist for the Bradford Town Council has already run trackless trolley cars, and the same is true of several other local authorities. The Minister of Transport has agreed to Bradford Town Council operating one-man railless electric vehicles, so further economy is in sight.

R. H. Wilkinson, the borough tramway manager at Bradford, has designed a car of the sort which will be driven by one electric motor. It is a single-deck car and will seat thirty passengers. To remove objections to the weight of a larger double-deck trackless car, Mr. Wilkinson has got out a design for a six-wheel vehicle. Half the weight is on the rear axle and the other half distributed equally between the other two axles. The seating capacity is twenty-four on the lower deck and thirty-three on the upper, and the overall length is 23 ft. 10 in. A 60-hp. motor will be used.

The Town Council at Leeds, which also already run trackless cars, is about to experiment with a vehicle of this kind fitted with pneumatic tires. It will be double-deck car seating fifty passengers in all. Another novelty is that the drive from the motor will be through the front wheels. In Glasgow it is proposed to proceed with the construction of some authorized tramway extensions, and also to experiment with the trackless trolley system on one route.

The prospect of a co-ordinated development of all methods of London local passenger transportation has again been postponed indefinitely. Sir Eric Geddes, Minister of Transport, stated in the House of Commons on March 21 that a bill for the establishment of a London Traffic Authority had been under consideration by the government but in view of the general need for economy, both in money and in Parliamentary time, it had been decided that it was not desirable to proceed with the bill at present. Moreover, the proposal was so highly contentious that it seemed impossible to deal with it until some of the matters in dispute had been eliminated. Further, it seemed hopeless to carry out the proposal unless the British Exchequer financed it, and that was a matter of great difficulty at present.

TRAFFIC BOARD FOR LONDON

It may be recalled that within the last year or so a select committee of the House of Commons and an advisory committee of the Ministry of Transport after inquiries recommended the constitution of a traffic board for London to co-ordinate services and guide new development. This proposal only confirmed the recommendations of various expert bodies which examined the subject in past years. Broadly it may be said that the transport undertakings of the metropolis are in favor of having a traffic board, but there are so many local authorities and other bodies en-

titled to have a say and there is so much difference of opinion among them that prospects of a solution are not bright. Apart from that the government is now engaged in a great economy campaign. It is cutting down expenditure in many directions, and there is little chance of any new expenditure being sanctioned except for objects that are urgently necessary.

LARGEST BRITISH POWER STATION

One or two interesting points may be cited from the speech of R. P. Sloan, manager of Newcastle-upon-Tyne Electric Supply Company, at the annual meeting which was held on March 22. The company, long a successful one, supplies electricity for many purposes, including traction. Mr. Sloan said that the profits for the year were £392,643, or £144,449 in excess of those for 1919. This was a disappointing year, as the increase was only £50,249 above 1918. The extensions of Carville power station were now completed, making this station, which now had a capacity of more than 130,000 hp., the largest electrical generating station in operation in the United Kingdom. The North Eastern Railway main line electrification scheme had not yet materialized, but negotiations had been re-opened by the railway company and there was reasonable hope that the scheme could be proceeded with although on a somewhat smaller scale than was first contemplated. In the event of the scheme maturing and proving a success there was every likelihood of its leading to much larger developments.

J. H. Armstrong, the chairman, referred to his retirement from that post and said that on his suggestion Mr. Sloan would become chairman and managing director. Mr. Sloan had been manager for more than sixteen years. He came to the company with the birth of the power scheme—the first one to be established in the United Kingdom and he believed in the world—and had nursed it into the powerful and well-developed being it was now. Mr. Armstrong will continue in office as vice-chairman of the company. He received from the meeting tributes of appreciation of his services.

Proposals are being made by Manchester and by some other places to give the local authority power to prevent other vehicles from being driven past tramcars on the nearside when the cars are stopped for setting down and taking up passengers. The idea is to secure the safety of passengers, and though the plan has been worked for some time in Glasgow it seems likely, in the case of streets of very dense traffic, to cause much street obstruction.

Arrangements are being pushed forward for electrifying the whole of the cable tramway system of Edinburgh at an estimated cost of £825,000. The manager is of the opinion that the saving in working expenses will more than cover the interest and sinking fund charges on the new capital.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Franchise Surrendered

Duluth Street Railway Company Goes Under New Law, but Rejects Cost-of-Service Proposal

The Duluth (Minn.) Street Railway has elected to operate under an indeterminate permit perpetuating the existing franchise grants and permitting fares to be fixed by the State Railroad & Warehouse Commission, under authority of a statute passed by the 1921 Legislature. At the same time the company has announced its intention to reject the cost-of-service franchise, prepared by a committee of Duluth engineers. The company's attorneys hold that the proposed franchise conflicts with the city charter in so far as the provision with reference to rates is concerned.

Request for an indeterminate permit has been filed with the city clerk and under the law recently passed by the Legislature it becomes the duty of that officer to furnish the company with a certificate, which is then filed with the Secretary of State. The city, in turn, is also required to issue the indeterminate permit. Under the proposed engineers' franchise the rates would be determined by means of a contract between the city and the company providing that the fare charged should vary inversely with the dividend rate allowed.

As noted in the *ELECTRIC RAILWAY JOURNAL* for April 30 the recent legislation gives to the City Council complete control over services, extensions and routing and makes the local governing bodies parties to the valuation proceedings before the state commission. The state commission, however, is given exclusive and initial right to regulate rates, subject to appeal to the courts. Indeterminate permits are authorized to take the place of the present franchises of the railways. These permits, however, are subject to revocation by the Legislature.

In Duluth the company will withdraw its action now pending in the federal court by which it hopes to obtain a temporary injunction against the city from proceeding with an action in the state courts to enforce it to give additional service on several of its lines, providing that the State Railroad & Warehouse Commission looks favorably on an application for an increase in fares.

A. M. Robertson, president of the Duluth Street Railway, has made a statement covering the company's views on the matter of the rejection of the proposed cost-of-service franchise and on its election to proceed under an indeterminate permit. He said in part:

Our attorneys have given us legal opinion that the cost-of-service franchise prepared by the Engineers' Club, with reference to rate of fare, is in direct conflict with the city charter and could not be made operative without an amendment to the city charter. In view of this opinion there is no other course open to the company than to file with the city clerk written declaration that it desires that its existing franchise grants shall become an indeterminate permit under the provisions of chapter 278, laws of Minnesota, 1921.

It is of the utmost importance that the company obtain financial relief through an increase in fare, which will enable it to make necessary permanent improvements, render satisfactory service and give to its stockholders a reasonable rate of return on a fair value of the company's property, as provided for in the state law. The company will, as soon as possible, make application to the Railroad & Warehouse Commission for an emergency or temporary rate of fare pending a valuation of the property.

The officers of the company believe that the new state law affords a foundation upon which its credit may be restored and which will put it in a position to meet the demands of the city for extensions, additional service and permanent improvements, as the same are needed from time to time.

As soon as the company shall receive the needed financial relief through increased revenues it proposes, in co-operation with the City Council, to do first those things for which there is the most pressing demand, and it asks from the City Council and the people of Duluth reasonable co-operation in its efforts to build up the property to its pre-war physical condition.

Injunction Invoked in New Orleans

In anticipation of hostile action by the State authorities to the collection of the present 8-cent fare Receiver O'Keefe of the New Orleans Railway & Light Company petitioned Judge Foster, of the Federal District Court, for a temporary injunction against the Attorney-General and Assistant Attorney-General of the State, enjoining them from bringing suit in any form against the company.

The injunction was granted on April 29, hearing upon the prayer of the receiver's petition having been set for May 3. Decision was expected to be made then whether the injunction will be made permanent or set aside and the State allowed to proceed with the suits which it is alleged Assistant Attorney-General Hall contemplates filing against the company.

The application for a temporary injunction against the State authorities grows out of threats which Receiver O'Keefe alleges Judge Hall, Assistant Attorney-General, has made in the public press and elsewhere of taking action against the railway or some of its units for forfeiture of charters, franchises and rights.

It is further alleged by Receiver O'Keefe that such action is contrary to the decree of Judge H. B. Clayton, issued on April 21, in which the city was enjoined from interfering with the collection of an 8-cent fare by the railway.

Ambitious Missouri Project

Preliminaries Being Arranged for Construction of Electric Railroad from Kansas City to St. Louis

The Missouri Central Construction Company is underwriting and doing construction work on an electric interurban railway to connect Kansas City and St. Louis, 248 miles. The line is to be known as the "St. Louis-Kansas City Short Line." The company has now secured three-fifths of the right of way, and more than 30 miles are now graded. It is said that \$380,000 has to date been put into the project. The company is moving slowly, with a minimum of local publicity through the state and at terminal cities.

Two of the principles governing location of route hold particular interest. The electric line is being located to serve rural Missouri between the terminals, and therefore (1) avoids rather than touches the larger towns; (2) does not parallel closely the steam lines.

The company is not selling stock to farmers, nor offering it to them, in connection with right-of-way negotiations. This policy was taken because of the possible implications that might rest against the company should it make stock subscriptions a condition of route location. It is said that one of the most serious handicaps to present location and securing of right-of-way is the remembrance by farmers of previous similar projects not carried through in connection with which stock was sold to farmers selling land for right-of-way.

The president of the Missouri Construction Company is George R. Collins, president of the National Benevolent Society, a fraternal insurance organization with headquarters at Kansas City. Mr. Collins was active in securing a right-of-way between Kansas City and St. Joseph, Mo., a suit concerning this right-of-way resulting in a judgment under which the Kansas City, Clay County & St. Joseph Railway paid a large sum to Mr. Collins and associates, this company eventually building and operating an electric interurban between the two cities.

Thomas F. Marshall, vice-president of the company, is a capitalist at Marshall. He is active in the work of securing right-of-way. Harvey D. Taylor, secretary, is an attorney. Frank E. Lott, treasurer, is a real estate operator at Kansas City, who has been active for several years in promoting the enterprise. The consulting engineer is W. B. Cauthorn, Columbia, Mo. The right-of-way office is at 501 Finance Building, Kansas City.

Philadelphia Wages Cut

Seven and One-Half Cents Taken Off Trainmen Under Wage Average Plan

Announcement was made on April 28 by the Philadelphia (Pa.) Rapid Transit Company that a general reduction of 7½ cents an hour would be made in the wages paid to the company's trainmen, the reduced wage scale to become effective on May 1. It is also proposed to reduce the wages of track laborers, trackmen, pavers, rammers, switch cleaners and drivers by 14½ cents an hour, this cut also to become effective at once.

The change in wages, it was said, will adjust the company's scale to the average of the scales of the railways in Buffalo, Cleveland, Detroit and Chicago, on which average the Philadelphia scale is based. In three of those cities a reduction in wages has been declared, thus lowering the average for the four. Adjusting the Philadelphia scale to the new average, it is said, will enable the Rapid Transit Company to save \$1,000,000 or more a year. The company's announcement was as follows:

The co-operative plan for collective bargaining of the Philadelphia Rapid Transit Company provides as a basis for determining wages the average of the wage scale of the street railway companies of Buffalo, Cleveland, Detroit and Chicago.

In conformity with the wage decrease of the Cleveland Railway and the Detroit United Railway to be made effective on May 1, 1921, the general committees under the co-operative plan agree that the scale of wages (in cents per hour) of the trainmen of the Philadelphia Rapid Transit Company to be established effective as of May 1, 1921, should be as follows:

Surface motormen and conductors	60, 63 and 65
Elevated motormen	63, 66 and 68
Elevated conductors	60, 63 and 65
Elevated guards	60, 62 and 63

In conformity with the decreases made in Cleveland and Detroit, effective on Jan. 1, 1921, and in Buffalo to be made effective on May 1, 1921, the wage scale of the regular employees of way department track forces, namely: track laborers, trackmen, pavers, rammers, switch cleaners and drivers, should be reduced 14½ cents an hour, effective May 1, 1921.

In conformity with the wage decrease of the Cleveland Railway and the Detroit United Railway the wage rates of other employees who received the increase of 7½ cents an hour, or \$15 a month, effective on June 1, 1920, and those employees who have been engaged at wage rates including the June 1, 1920, increase, should be decreased 7½ cents an hour or \$15 a month, effective on May 1, 1921.

Wage Cut Rejected in Salt Lake

Platform, shop and track employees of the Utah Light & Traction Company, Salt Lake City, Utah, have voted unanimously to reject the proposal of the company to reduce wages, ranging from 14 to 20 per cent. All other conditions of the proposed new working agreement, to run from May 1, 1921, to May 1, 1922, have been accepted by the employees. Arbitration of the wage section of the new agreement has been asked by the employees. H. F. Dicke, general manager of the company, states, however, that the question of arbitration will have to be passed on by the directors of the company. It is

claimed by Mr. Dicke that the arbitration clause in the present contract provides for arbitration of questions concerning the present contract, and does not cover negotiations in regard to a new contract.

The present shop scale is from 50 cents to 68 cents an hour. It was proposed to cut this scale approximately 20 per cent, making it from 40 cents to 56 cents an hour.

At the present time the trackmen are receiving a maximum wage of \$5.25 and a minimum of \$4.50 for a nine-hour day. The company proposes a maximum of \$4.20 and a minimum of \$3.60 for the same length of workday.

Platform men are receiving at the present time a maximum of 64 cents an hour for a nine-hour day. It is proposed to reduce this maximum to 55 cents an hour. The minimum pay of trainmen is 57 cents an hour. This it was proposed to cut to 48 cents an hour. The reductions here are approximately 14 per cent. The proposed minimum of 48 cents an hour would prevail only for first-year platform men, their wage thereafter to be 55 cents an hour.

New Utility Bill Submitted in Illinois

Plans for a radical change in the Illinois public utilities law will probably come to a head in the Legislature of that State in the near future. This is in accord with the campaign pledges made by Governor Small. A draft of the new bill has been submitted and while it is subject to change it is expected to be approved with the important features retained.

Summarized, this bill provides for a repeal of the present public utilities act and abolition of the present commission. It also provides that in case a contract is entered into between a city and a public utility concerning rates or service, this cannot be abrogated except by a majority vote of the people in the city affected. The people of any community would also be permitted to adopt home rule through its council or any governmental commission. Likewise, home rule may be abandoned by majority vote of the people. Any public utilities which are not within a municipality and all public utilities in municipalities which do not adopt home rule are to be placed under the jurisdiction of the Illinois Commerce Commission. This commission would consist of seven members to be appointed by the Governor for terms of four years. There would also be eight assistant commissioners to hold hearings or make investigations. Appeals from the commerce commission would be taken to the Circuit Court of the county in which the case arises.

The Governor has been working in harmony with the Chicago city administration which is endeavoring to form a transportation district with electric railway service based on a 5-cent fare and taxation to make up any deficit which may occur.

Fifteen Cent Reduction

Final Proposition Made by Manager Blinn at Akron—Arbitration Likely

In referring further to a discussion which took place on April 14 between representatives of the Amalgamated and officers of the Northern Ohio Traction & Light Company, Akron, Ohio, in regard to wages to be paid trainmen beginning May 1, A. C. Blinn, vice-president and general manager of the company, said in a communication to the men dated April 22 that the question of wages must be determined not only by the cost of living, but by the company's financial condition. He said that it was his understanding that the proposal made on April 14 had been rejected. A marked reduction from the present wage scale was absolutely necessary. He submitted as final:

1. A straight reduction of 15 cents an hour from the present scale.

2. Submission of the entire question of wages to arbitration if the proposed wage scale was not accepted.

Under the reduction suggested the wages in cents per hour would be as follows:

	City Lines	Suburban Lines	Interurban Lines
First year	44	45	50
Second year	47	48	52
Thereafter	50	51	56
Brakeman	50	50	50

Three cents per hour additional over the city scale would be paid for the operation of one-man city cars:

Mr. Blinn further explained that in case the first proposition was accepted the following working condition should prevail:

The company reserves the right to make and change all schedules; said schedules to provide for necessary lay over.

All runs on working schedule shall conform to a ten-hour work day as near as possible.

All runs on working schedule to be not less than eight hours. Working schedule shall not include tripper runs.

Motormen, conductors or brakemen working runs of eight hours or more who are called to work extra shall be paid time allowed plus one hour.

Any motorman, conductor or brakeman assigned for work at a specified time, and if for any reason, not their own, do not start to work at the time specified, shall be paid for the time elapsing between the time they reported and the time they actually started work in addition to time worked.

Any motorman, conductor or brakeman assigned for work at a specified time and on account of the weather or for other reasons, not their own, do not do any work, shall be allowed one hour time for reporting.

Motorman and conductor who properly make out accident report or reports, at the completion of their day's work and same is O.K'd by dispatcher on duty will be paid for one hour's time.

Mr. Blinn further said that in the event the second proposition was accepted the working conditions previously noted should likewise be subject to arbitration, the board of arbitration to settle the question by May 20.

The men rejected the company's arbitration proposal on Tuesday night and threatened an outlaw strike. P. J. Shea, international officer, declared the charter would be taken from the local organization if the men walked out on Thursday as threatened.

\$32,000,000 Terminal Improvement

Electric Interurban and Steam Lines at Los Angeles Ordered to Start Work at Once on New Union Depot

The Railroad Commission of California has ordered the Southern Pacific, Santa Fe, Los Angeles and Salt Lake Railroad Companies and the Pacific Electric Railway at Los Angeles to proceed with the construction of a union passenger station on the Plaza site. Construction of the station, as set forth by the commission, is considered as the first step in a comprehensive plan of transportation development in Los Angeles, embracing the gradual elimination of all the important grade crossings in the city.

THE commission orders that the railroad lines, affected by the order, must name a joint committee in thirty days, while plans for the union depot must be filed within six months. In the event that the committee is unable to agree upon a chairman, this official will be selected by the Railroad Commission.

The commission states that the Pacific Electric's most urgent service and traffic problems dealing with the Hill Street and Hollywood situation are not affected by the present proceedings and nothing contained in same will prevent or need delay a partial or complete solution of these difficulties. Both the Pacific Electric and the Los Angeles Railway, said the commission, will have to make provision for adequate local street railway service to and from the new union passenger depot which is proposed.

In concluding its reference to the terminal controversy, the commission said that, in selecting the Plaza site, it "assumes that the city will carry out its repeatedly announced intention to further in every possible way the consummation of the general plan, which by resolution the city authorities have so strongly urged the commission to promulgate in these proceedings."

The commission indicated that it was not practicable at this time to deal extensively with the matter of cost and division of expenditure, and that these features would be reserved for a subsequent decision. The cost of the Union Station would be much less than that of the entire plan, the commission stated, and the figure would be made known after the plans of the engineering committee have been filed with the commission. The commission declared it was not contemplating an unreasonably large expenditure, and that the Southern Pacific and Salt Lake Roads, and the Pacific Electric Railway contemplated the expenditure of approximately \$17,000,000 for incomplete development.

The campaign for a union terminal in Los Angeles began in the year 1911, following a series of grade crossing accidents in the city and county, and the Railroad Commission was petitioned to order the elimination of grade crossings. Fearing that it lacked full authority to cope with the situation, the commission ruled against itself to get the opinion of a higher court. When an appeal was made to the State Supreme Court the commission was informed that it had full authority in the prem-

ises and that it should lose no time in satisfying its petitioners.

Richard Sachse, chief engineer of the commission, was placed in charge of the work, and with his staff of engineers spent two years in preparing a study and survey of the traffic conditions in the city of Los Angeles. This survey covered more than 1,000 pages when it was finally completed.

At the time Mr. Sachse reported on this union terminal to be located at the Plaza, in accordance with his recommendations, it was stated by him that the completed improvements could be had for \$32,233,445. His report figured grade crossing elimination along the Los Angeles River at \$4,596,000; carrying this work through to Pasadena, \$6,700,000; Butte Street trackage, \$192,000; union passenger terminal and yards, \$10,933,000; union freight station, \$2,575,000; new freight yards, \$2,835,000; doubling tracking from Los Angeles to Colton, \$136,000 (S. P. Lines); team yards, \$629,000; additional trackage, \$710,000; subway and elevated work, \$5,741,000; release of sites, \$2,800,000.

Throughout the proceedings, all three of the steam roads and the Pacific Electric Railway opposed the union passenger terminal proposed. It is apparent that the railroads intend to appeal to the courts before they submit to the commission's orders—that the matter will first be carried to the Interstate Commerce Commission, then to the highest courts of the United States, if necessary, in order to obtain relief from what the railroads term a drastic order of the commission.

Tacoma Company Cannot Proceed with Extensions Now

At a public meeting held in Tacoma, Wash., recently, attended by members of the City Council, officers of the state department of public works, and officials of the Tacoma Railway & Power Company, 300 residents of the so-called Jefferson Square District, lying between Sixth Avenue and the Point Defiance car line, presented their urgent need of extensions to street car service, and received assurances of the city and state officials that the matter would be thoroughly investigated.

E. V. Kuykendall, state director of public works, stated that the state engineering department would take any action found necessary by the investigation. Tacoma Railway & Power Company officials present explained

that the company had been unable to extend the line because its returns were insufficient.

N. L. Robbins, statistician of the company, presented figures to show that the cost of operating one extension of the line would be \$51 a day, with estimated income of \$20.36. He pointed out that since 1918 the company has been trying by various means, such as bus and stage lines, to cover this district, all efforts being financially unsuccessful. Richard T. Sullivan, manager of the company, stated that during the year 1919 the company lost \$103,000 in operating its lines in Tacoma and that while the present outlook was more hopeful the company could not be burdened with any further expenditures until returns had begun to show an increase. He expressed his willingness to co-operate in any way to secure the extensions.

Strike Narrowly Averted

Walkout of Detroit United Employees Put Off for Week Pending Resubmission of Pay Cut

After employees of the Detroit United Railway had voted eight to one in favor of suspension of work and the City Council had met with the Mayor to consider the situation a conference between the company officials and the representatives of the four unions resulted in a truce which averted for at least one week the threatened tieup.

At the conference the day before the company's proposed reduction of 20 per cent to 28 per cent in its platform men's wages was to go into effect an agreement was reached whereby the company agreed to postpone for one week the posting of bulletins announcing the wage reduction. In event the men accept the company's proposal at the end of the week the reduced rate will be retroactive from May 1.

After a conference the president of the Amalgamated Association and company officials expressed the belief that the questions voted on by the men had not been thoroughly understood when they voted to reject the proposition submitted to them and empowered the joint committee to call a strike. The propositions on which the men voted are:

1. Do you favor acceptance of the company's proposed working agreement based upon the Cleveland agreement calling for a wage scale of 55, 58 and 60 cents an hour?
2. Do you favor submitting the entire question of wages, hours and working conditions to a board of arbitrators?
3. Do you authorize a suspension of work, if necessary?

According to a report on the ballot, 273 of the union members voting favored the first plan, 154 were in favor of arbitration according to proposition number 2, and 3,321 voted to authorize a walkout.

The vote Saturday is the outcome of negotiations carried on by the company and the men since the company announced its proposed wage cut from 70, 73 and 75 cents an hour to 50, 55, and 60 cents an hour, effective on May 1.

The unions voted unanimously to reject the cut and offered to arbitrate the question of wage reduction only. The company in turn insisted that any arbitration must include the entire working agreement between the company and the unions. No agreement being reached the company offered a new plan based upon the Cleveland wage scale of 55, 58 and 60 cents per hour.

Announcement by Mayor Couzens that the street railway commission would reduce the wages of employees of municipal lines from 70, 73 and 75 cents an hour to 55, 58 and 60 cents an hour was followed by a vote of the city employees to follow the union lead.

It will be explained to the men that the offers made by the company are the only conditions that can be secured without a strike. With this in view the representatives of the union asked the company to withhold the bulletins for seven days and leave the proposition that they had submitted stand for the men to consider and ballot on again. To this the company agreed.

Elevated Men Accept Cut

New Agreement between Trustees and Amalgamated Involves Reductions to Take Effect in Installments

The trustees of the Boston (Mass.) Elevated Railway have entered into a new agreement with their employees who are members of the Amalgamated Association, involving wage reductions of from 7 to 10 per cent, effective during the twelve months beginning July 1. For blue uniform men who have reached the senior grade of pay—after one year's service—the reduction is to be 7 per cent, divided into two parts, approximately half the reduction being applied July 1, and the balance Jan. 1, 1922. For the balance of the employees under the Amalgamated agreements the straight reduction of 10 per cent will be effective July 1.

As practically all the blue uniform men now employed are of the senior grade, the company will only save about 3 per cent on trainmen's wages during the first six months of the new agreement. It is estimated that the total savings to the company, under this new agreement will be approximately \$1,000,000 during the twelve months. The total wages for 1920 were \$17,216,445.

A considerable number of employees who are working under agreements of the various skilled crafts unions are not affected by this new wage scale, but as their various agreements expire it is not unlikely that they may be renewed with moderate reductions in wages to conform to labor market conditions in Boston.

The negotiations attendant upon the formation of this new agreement were unique because of their brevity and harmonious character. After brief preliminaries between the officials representing the company and the men, the wage proposals were submitted to vote of the union membership and accepted without dissent in less than two days.

The old agreement expires, as far as wage scale is concerned, July 1, and sixty days' notice is required of either party of any desire to change any portion of the agreement.

The wage scale (in cents per hour) for blue uniform men as at present and as agreed for the next year follows:

SURFACE TRAINMEN			
	Present	July 1 to Jan. 1	Jan. 1 to July 1
Minimum (3 months)...	58	52	52
Intermediate (9 months)...	64	58	58
Maximum (thereafter)...	70	68	65

Operators of one-man cars are to receive a differential of 10 cents an hour, instead of 15 cents as at present.

It is expected that other than the wage scale, the old agreement will be renewed without any important changes in working conditions. Minor

MOTORMEN—RAPID TRANSIT TRAINS			
	Present	July 1 to Jan. 1	Jan. 1 to July 1
Minimum (3 months)...	65	61	61
Intermediate (9 months)...	66	62	62
Maximum (thereafter)...	72	70	67

GUARDS—RAPID TRANSIT TRAINS			
	Present	July 1 to Jan. 1	Jan. 1 to July 1
Minimum (3 months)...	62	56	56
Intermediate (9 months)...	63	57	57
Maximum (thereafter)...	65	63	60

matters are now being negotiated. The 8-hour day with 60 per cent of all runs coming inside an 11-hour spread is in effect. The trustees issued the following statement to the men as indicative of their policy:

In reaching this conclusion the trustees have given consideration and weight:

1. To the fact that although a substantial decrease has already taken place in many items affecting the cost of living that cost is not yet upon any settled basis so that it is peculiarly a fitting time to put in practice the belief of the trustees that to be consistent they should be as deliberate and conservative in following the cost of living when it is upon a downward trend as in following it when it is in an upward movement.

2. To the fact that the trustees thoroughly appreciate the co-operation that the men have given to the management during the past year which has made possible what would otherwise be impossible in the saving of expenditures amounting to large economies; in other words the existence of the spirit which has financial as well as other value in the conduct of this service.

3. The fact that as public officials they are in charge of a public business entirely disconnected from any private or competitive industries and that in this attitude they should be careful not to adopt as a standard for the payment of compensation any other rule than that of a full fair wage for work that is earnestly performed.

Wages Reduced in Lexington.—

Wages of motormen and conductors employed by the Kentucky Traction & Terminal Company Lexington, Ky., have been reduced 5½ cents an hour. The reduction was made through agreement between A. A. Babblitz, Lexington, arbitrator for the men, and George MacLeod, Versailles, arbitrator for the company. The negotiations were based, it was stated, upon an agreement between the men and the company which provided for changes in the wage scales in accordance with cost of living increases and decreases as reported by U. S. Department of Labor. The minimum wage under the new agreement is 38½ cents an hour and maximum 41½ cents.

Strike Averted

Eastern Massachusetts Company and Employees Agree to Arbitrate Wages and Other Details

Through concessions made at practically the last moment by both the company and the employees, the expected strike on the lines of the Eastern Massachusetts Street Railway failed to materialize on May 2 as anticipated. The important question of the handling of discipline cases was settled in conference, and with this point finally agreed upon, both sides consented to leave the question of wages and other details to the Massachusetts State Board of Conciliation and Arbitration. The company withdrew its demand for settlement on the open shop basis, in view of the agreement on the discipline question.

A three-cornered agreement has been made between the company, the employees and the State Board, looking toward a prompt hearing and settlement of the entire problem. James H. Vahey, the attorney for the Amalgamated Association, is to take not more than two days to present the case of the employees, the company is to have the next two days, and the State Board in turn has agreed to render its decision on or before Saturday, May 14. Many of the minor points of the new agreement were settled in conferences.

The handling of discipline and discharge cases was the stumbling block which kept both sides from getting together sooner. Under the old agreement, the trustees found themselves embarrassed in maintaining discipline, due to the fact that any man discharged by the company could go before his local union, demand arbitration and secure it on a favorable oral vote. In its practical application, this meant that the management had before it the likelihood, if not certainty, of arbitration in every discipline case.

In the new agreement, a man who is discharged will have the right of appeal to the assistant general manager. If dissatisfied with his decision, he may appeal to the labor committee, consisting of four members named by the vice-president, the assistant general manager, the general counsel and one of the trustees. Failing to be satisfied with their decision he may go before his local union and request arbitration. If his union sustains him, by ballot, his case is first to be reviewed by Trustee Wadleigh and Attorney Vahey, who will make a report on it. If they report against the man or disagree, another referendum vote of the local union is required before the actual arbitration proceedings are undertaken.

This procedure is designed to permit of the most thorough review before resorting to the expense of an arbitration.

It was not until this point was settled on the above described basis, on Saturday, April 30, that both sides agreed to leave the wage scale and other contested questions to the State Board of Arbitration.

Franklin Medal to Frank J. Sprague

The Franklin Institute of the State of Pennsylvania will hold a meeting on May 18 for which an interesting program has been arranged. A certificate of honorary membership will be presented to John J. Pershing, General of the United States Army. M. Jusserand, the French Ambassador, will be presented with the Franklin Medal and certificate of honorary membership on behalf of his government for Professor Charles Fabry, University of Paris. Frank J. Sprague will also be honored with the Franklin Medal and certificate of honorary membership. After other honors have been conferred papers will be read. "Studies in the Field of Light Radiation," prepared by Charles Fabry, D.Sc., will be read by Joseph S. Ames, Ph.D., the Johns Hopkins University, Baltimore, Md., followed by "Electric Traction—A Review," by Frank J. Sprague.

News Notes

Accept Wage Cut.—Employees of the Auburn & Syracuse Electric Railroad, Auburn, N. Y., have decided to accept the 25 per cent wage reduction pending settlement by a board of arbitration. The possibility of a strike is now averted. Conferences will continue between the railway and men and an agreement may be reached before arbitration proceedings are started.

Bus Company Makes Improvements.—The Central Auto Stage Terminal, a company organized by twenty-one motor stage lines operating eighty stages out of Seattle, is remodeling a two-story masonry building at Western Avenue, Madison, Post and Marion Streets, from which approximately 5,000 passengers will be discharged and loaded daily. The company is expending \$20,000 in improvements to the structure.

Arbitration in Syracuse.—It has been announced that arbitration will be resorted to in the wage dispute on the Rochester & Syracuse Electric Railroad, Syracuse, N. Y. T. C. Cherry, vice-president of the road, and union officials have agreed on the manner of selecting arbiters and names will be announced soon. The wage adjustment will be similar to that under which the New York State Railways' wage dispute is being settled.

More Employees Accept Cut.—Conductors and motormen of the Bay City division of the Saginaw-Bay City Street Railway voted to accept a reduction of 10 cents an hour in their pay from May 1. The action was voluntary on the part of the men, who said they realized that the jitney bus competition, practically unregulated by the city, had so reduced the revenues of the

company that they could no longer pay rates under which they had a working agreement.

Arbitration in Des Moines.—The Des Moines City Railway has appointed B. F. Elbert as its representative on the arbitration board which will decide the wages of its trainmen for the coming year. The railway men's union has its representative also in line and it is expected that a third arbitrator will not be needed. This will be the seventh arbitration committee which has been formed since 1905 to settle disputes between the railway and its men. The employees recently rejected the company's wage offer which placed the maximum wage at 60 cents.

Court Hears Attack on Commission.—Justice McAvoy in the special term of the Supreme Court on April 27 heard argument made by Hiram W. Johnson, as special counsel for the city of New York, to restrain George McAneny, Major-General John F. O'Ryan and Le Roy T. Harkness, from acting as transit commissioners in New York City. Mr. Johnson also seeks an order restraining the newly appointed commissioners from taking over the books, papers, etc. Decision in the matter was reserved. Justice McAvoy allowed the attorneys five days in which to submit briefs.

Programs of Meetings

American Society of Mechanical Engineers

The Western Society of Engineers is co-operating with the Chicago committee in the preparation of a program to be presented at the spring meeting of the American Society of Mechanical Engineers at Chicago, May 23-26. This session will be devoted to a consideration of the problems of Chicago as the Rail-Water Gateway of the Middle-West.

This revelation of the magnitude and complications of one of the world's greatest railroad centers will be of vital importance. The program will be supplemented by an address on the Development of the St. Lawrence Waterway. The titles of the addresses follow:

"The Relation of Steam Roads to Rapid Transit Development," by Blon J. Arnold.

"The Function of the Terminal Survey," by J. R. Bibbins.

"Some Aspects of the Problem of Chicago as the Mid-Interior Rail-Water Gateway," by J. R. Bibbins.

"Freight Tunnel System as a Terminal Distribution Agency," by J. R. Bibbins and E. J. Noonan.

"Development of Air Rights in Connection with City Freight Houses," by E. J. Noonan.

"Freight Movement by Motor Trucks, View Point of Carrier and Public," by Hugh E. Young.

Well developed programs will be presented by the Professional Divisions of the Society devoted to forest products, fuels, machine shop, management, material handling, power, railroad, and a specially important session will be devoted to Training for Industries.

H. B. Reynolds of the Interborough Rapid Transit Company, will present the results of a series of tests on a

30,000 kw. General Electric steam turbine installed at the Fifty-ninth Street power house of the Interborough Rapid Transit Company, New York.

Southwestern Electrical & Gas Association

At the opening session of the seventeenth annual convention of the Southwestern Electrical & Gas Association at Galveston, Tex., on May 18 the president's address and report of the secretary will be heard. On May 19 at the first session of the Street & Interurban Railway Section "problems of the minute" in electric transportation will be discussed. On the afternoon of May 19 the first general session will be held at which speakers of prominence in the utility and scientific field will make addresses and answer inquiries. Among these will be Martin Insull, "The Public's Business," J. H. Gill, "The Utility Association as a Permanently Profitable Investment." At the second meeting of the Street & Interurban Railway Section the usual "Round-the-Table" session will be held. This informal "get-together" method where no technical papers are read but where the members discuss freely the status of the electric railways covered by this association (Texas and Louisiana) has proved very successful. At the second "general" session W. G. Busby, chairman, Mo. Public Service Commission, will read a paper, "State Utility Commissioners." There will also be two addresses on "Hometown Financing of Local Utilities," by those who have had recent practical experience in this matter and an address—from the banking side—on the same subject by a Texas banker.

International Street & Interurban Railway Congress

A meeting has been called to begin May 29 and end June 3, 1921, in Vienna of the International Strassenbahn und Kleinbahnverein, recently organized in Nuremberg. Papers are scheduled on the following topics:

(1) Roller bearings in street railway operation, (2) economic condition of steam railroads, (3) relation between cars and tracks, (4) outlook for the light railway, (5) co-ordination of traffic facilities in large German cities, (6) standardization and maintenance, (7) the Copenhagen street railway, (8) technical difficulties in operating a railway in Amsterdam, (9) car construction, (10) ball bearings for trolley cars, (11) psychological tests for employees, (12) proposed electric line in Christiania, Norway, (13) fares and headways and their effect on receipts; (14) high-tension direct-current railways; (15) mercury-arc rectifiers and automatic substations, (16) trackless trolleys, (17) one-man car operation.

The secretary of the association is Dr. Arthur Ertel, Favoritenstrasse 9, Vienna. The president of the association is Ludwig Spängler, general manager, Vienna Municipal Tramways.

Financial and Corporate

Twin City Earnings

Company Is Able to Increase Dividends Nearly 7 per Cent Gain in Traffic

The annual report of the Twin City Rapid Transit Company, Minneapolis, Minn., for the year 1920 indicates an improved financial condition over 1919. The net earnings of the company for the year were sufficient to declare a 3 per cent dividend on the common stock, in addition to the regular dividend on the 7 per cent preferred stock.

The accompanying tables give in detail the income account for the year in comparison with the year 1919. The percentage change is also shown. Details of the traffic handled and other miscellaneous statistical information are given in another table.

During the year the basic fare in both St. Paul and Minneapolis was raised to 6 cents. This rate became effective in Minneapolis on Aug. 16 and in St. Paul on Sept. 13. These increases in fare were made necessary by a substantial increase in wages to the men on the cars. A substantial increase in service was also made to meet

the demands of the cities in return for the right to change the basic rate of fare. Practically 1917 schedules are now in operation. The results for the year, so far as traffic was concerned, were better in Minneapolis than in St. Paul.

The physical condition of the property is being improved as rapidly as the finances of the property will permit, and it is anticipated that the property will soon be restored to as good a physical condition as existed prior to the war. Cars are being remodeled to provide front exits, for which there is a public demand. Other cars are being rebuilt for trailer operation to facilitate handling rush-hour traffic more economically than with single-car operation. During 1920 nearly 13 miles of track in the downtown districts were laid in enlarging the loop facilities. The expenditure for these extensions has been justified by the company being better able to reduce congestion during the rush hours.

During the year ten-year gold notes were issued by the subsidiary companies, namely, the Minneapolis Street

Railway, the St. Paul City Railway and the Minneapolis & St. Paul Suburban Railroad, as evidence of their indebtedness to the holding company, the Twin City Rapid Transit Company. These notes total \$9,850,000 and are to be held in the treasury of the Twin City Rapid Transit Company until such time as the condition of the money market and the earning power of the subsidiary companies warrant their being offered to the public for general investment.

Return of Trolleys to Steam Road Urged

Return of the stock of the Connecticut Company, now held by federal trustees, to the New York, New Haven & Hartford Railroad, its former owners, was urged by Vice-President Edward G. Buckland of the railroad at a hearing on a resolution containing such provisions on April 27 before the committee on railroads of the Connecticut Legislature.

Mr. Buckland said that the electric railway company's lines would continue to be operated "if they could be made to pay"; and stated that the future of the lines, so far as their operation was concerned, would not be affected one way or the other by the proposed transfer of the stock.

A history of the trusteeship was briefly outlined by Mr. Buckland. He told of the action initiated against the New Haven railroad in 1908 for alleged violation of the Sherman anti-trust law; of how the suit was dropped during the Taft administration and renewed under Wilson in 1914. The "New Haven" road then agreed to the separation of the Connecticut Company because it did not wish to jeopardize certain pending financing. Mr. Buckland read an extract from a report by Howard Elliott, then president of the road, to the stockholders in which he pointed out that the road consented to the separation only under financial pressure.

Richard T. Higgins, chairman of the Public Utilities Commission, said he believed that a public utility operating only within the state should be under the supervision of a state body and not of the federal government, adding that the stockholders who were most interested in the prosperity of the lines should be vested with responsibility and control.

George D. Watrous, New Haven, counsel for the trustees, said that the trustees did not think it necessary to appear before the committee but he gave assurance that most of them would carry out an order to release the Connecticut Company's stock.

While Mr. Watrous and Mr. Higgins were disagreeing as to the possibility of the trustees disposing of the company's physical property, Mr. Buckland interposed the suggestion that a sale of the stock might result in the acquisition of the company's property by interests "even more undesirable than the New Haven Railroad."

INCOME STATEMENT — TWIN CITY RAPID TRANSIT COMPANY

Year Ended Dec. 31	1920	1919	Percentage Change
Revenue from transportation.....	\$12,879,281	\$11,351,739	13.5
Revenue from other railway operations.....	107,125	90,705	18.1
Total railway operating revenue.....	\$12,986,406	\$11,442,444	13.5
Way and structures.....	1,234,266	1,102,568	11.9
Equipment.....	1,475,076	1,245,070	18.5
Power.....	1,185,182	1,175,293	0.8
Conducting transportation.....	4,652,777	3,788,711	22.8
Traffic.....	43,561	62,450	30.2
General and miscellaneous.....	1,229,237	1,090,668	12.7
Transportation for investment-credit.....	25,268	19,702	28.2
Total railway operating expenses.....	\$9,794,834	\$8,445,059	16.0
Net operating revenue.....	\$3,191,572	\$2,997,385	6.5
Taxes assignable to railway operation.....	1,161,507	1,126,338	3.1
Operating income.....	\$2,030,065	\$1,871,047	8.5
Non-operating income.....	84,332	51,034	65.3
Gross income.....	\$2,114,397	\$1,922,081	10.0
Rent from leased roads.....	3,000	3,000	...
Interest from funded debt.....	1,080,684	1,087,446	0.6
Net loss miscellaneous physical property.....	21,264	32,829	35.2
Miscellaneous debits.....	10,349	10,454	1.0
Total deductions from gross income.....	\$1,115,297	\$1,133,729	1.6
Net corporate income transferred to profit and loss.....	\$999,100	\$788,352	26.8

STATISTICAL INFORMATION—TWIN CITY RAPID TRANSIT COMPANY

Year Ended Dec. 31	1920	1919	Percentage Change
Total miles, first main track.....	249.79	243.07	2.9
Total miles, second main track.....	184.82	177.40	4.2
Total single-track miles (all tracks).....	466.86	452.65	3.1
Average total trackage operated per year (miles).....	454.17	451.70	0.5
Revenue passengers carried.....	238,388,782	222,186,823	7.3
Transfer passengers.....	77,531,776	73,458,262	5.5
Total passengers carried.....	315,920,558	295,645,085	6.9
Gross passenger revenue.....	\$12,792,277	\$11,179,535	14.4
Gross passenger revenue per mile of line (average for year).....	\$53.969	\$47.303	14.1
Gross passenger revenue per mile single track.....	\$28,166	\$24,750	13.8
Average fare:			
Per revenue passenger (cents).....	5.37	5.04	6.6
Per total passenger (cents).....	4.05	3.78	7.1
Operating ratio (per cent).....	75.40	73.70	(b) 1.70
Taxes (per cent of gross revenue).....	8.90	8.90	(b) 0.74
Dividends paid:			
7 per cent on preferred stock.....	\$210,000	\$210,000	...
On common stock (a).....	\$660,000	\$550,000	20.0

(a) 3 per cent in 1920. 2.5 per cent in 1919. (b) Difference in points. Italics indicate decrease.

Canadian Road Does Well

Ten Per Cent Increase in Net Revenue Allows British Columbia Electric Railway to Pay Dividends

The annual report of the British Columbia Electric Railway, Ltd., Vancouver, B. C., for the year ended June 30, 1920, recently issued, reflects the prosperous financial condition of the country for that period. As a result of the increased population and trade expansion, the revenues of the company increased so that the annual gross receipts were the largest in the history of the company. Despite the heavy increases in the cost of operation and a proper allowance for depreciation, it was possible to declare reasonable dividends free of income taxes.

The growth of population has necessitated a substantial expenditure of capital during the past year. Past financial management has enabled the company to meet this expansion with-

abolition of the Public Utilities Commission.

The net income transferred to profit and loss from operation and other sources during the year amounted to £590,971 as compared with £530,327 the previous year. Adding the balance of the previous year gives a total revenue of £418,585 as against £369,105 in 1919.

\$466,159 Profit for Interurban

The annual report of the Utah-Idaho Central Railroad, Salt Lake City, Utah, shows a net profit of \$466,159 for the year 1920. This is \$199,277 less than the 1919 figure. The company operates 117 miles of road.

The report shows total operating revenue of \$1,056,001 and total operating expenses of \$690,815. The operating revenue was \$60,871 more than received in 1919, and the operating expense was \$26,259 less than it was the year before.

The total investment is \$5,221,900.

Monongahela Valley Succeeds

6 Per Cent Paid on Preferred Stock and More Than \$1,000,000 Put Into Property

According to the annual report of the Monongahela Valley Traction Company, the year ended Dec. 30, 1920, was considered to have been a reasonably successful one. The company formerly was engaged solely in the transportation service, but at the present time the railway revenues, amounting to approximately \$2,610,000, are only 44 per cent of the total; electric power sales produce 13.4 per cent, while gas production and coal mining operations provide the balance.

Eight one-man safety cars were purchased and installed in Clarksburg, W. Va., during the year. These cars cost \$50,000, or about \$6,250 each.

In the latter half of 1920 the company, according to the report, did not have sufficient railway equipment to carry all of the passenger traffic offered and this demand can only be met through the purchase of additional equipment and extensions to the railway lines. In view of this situation, the company officials believe that certain rates now charged can be advanced so as to permit the company more nearly to earn a fair return on its investment and thereby enable it to market securities with which to provide capital for necessary betterments and improvements.

STATEMENT OF INCOME—BRITISH COLUMBIA ELECTRIC RAILWAY, LIMITED			
Year Ended June 30—	1920	1919	Per Cent Change
Net revenue, including profit on exchange and less depreciation in securities.....	£609,045	£530,182	14.8
Registration fees, etc.....	318	145	119.3
Total revenue.....	£609,362	£530,327	14.9
Charges against revenue during the year			
Depreciation, sinking fund and renewals.....	£164,745	£154,727	6.5
Office rent, salaries, printing, legal, audit and agency expense.....	18,413	9,898	86.1
Trustees' fees.....	877	864	1.5
Corporation profits tax.....	13,000	.....	.....
Capital amortization fund.....	.....	1,818	.....
Total charges.....	£197,035	£167,307	17.7
Net revenue for the year from all sources.....	412,327	363,020	13.6
Add revenue from previous year.....	6,258	6,085	2.9
Gross income.....	£418,585	£369,105	13.4
Deductions—			
Interest and debentures and debenture stock.....	132,339	132,447	— 0.08
Dividend (5%) on perpetual preference stock.....	72,000	72,000	.....
Interim dividend on preferred ordinary stock with income tax thereon.....	65,032	36,000	80.5
Dividend on deferred ordinary stock with income tax thereon.....	£115,200	£86,400	33.4
Dividend on preferred ordinary stock with income tax thereon.....	21,368	36,000	— 40.6
Total deductions.....	£405,939	£251,058	61.7
Balance to carry forward.....	£12,646	£6,258	101.9

TRAFFIC STATISTICS—BRITISH COLUMBIA ELECTRIC RAILWAY, LIMITED			
	1920	1919	Per Cent Change
Passengers carried.....	66,411,030	53,326,288	24.5
Tons of freight carried.....	430,931	331,794	30.0
Freight cars interchanged with steam railroads.....	9,861	7,463	32.1
Light and power customers added.....	3,981	.....	.....
Kilowatt-hours of energy sold.....	116,196,981	94,953,424	22.4
Cu.ft. of gas sold.....	545,191,200	431,093,000	26.5

out having to issue additional securities. It was possible only because the debentures are irredeemable and consequently a considerable part of the provision for co-depreciation has accumulated in cash and is now being utilized for necessary extensions and developments. Had the debentures been redeemable, much of the provision made for depreciation would have been absorbed by the reduction funds, and it would have been necessary to ask for additional capital to meet the extensions in the community served.

Existing fares, the company says, were granted to enable it to meet the increased cost of operation, including higher wages. It is still necessary for the continuance of railway operation on an efficient basis that there should be some authority to whom appeal can be made to sustain or increase if necessary rates and fares in view of the

The total amount of stock issued was \$1,426,640. The funded debt outstanding at the close of the year was \$3,735,000.

During the year the road carried 1,036,727 passengers. Three passengers, twenty-five employees, and one other person were injured during the year and one employee was killed. The 371 persons employed during the year received \$409,788 in wages.

Sunbury Line Sold Under Foreclosure

Bondholders of the Sunbury & Susquehanna Railway, Sunbury, Pa., represented by John W. Whitaker, on April 25 bought the property at receivers sale for \$55,000. This includes 6 miles of line operating between Sunbury and Selinsgrove and a mile opposite the Pennsylvania Railroad yards North of Northumberland, and known as the Sunbury, Lewisburg & Milton Railway. The property has been in the hands of receivers for eight years.

Brooklyn Earnings Improving

The Brooklyn (N. Y.) City Railroad, formerly included in the system of the Brooklyn Rapid Transit Company, recently issued a statement of income for February, 1921, compared with February, 1920. Income figures covering the period of July, 1920, to February, 1921, also were announced. The earnings reported are shown in the accompanying table.

INCOME ACCOUNT—BROOKLYN CITY RAILROAD			
	Feb. 1921	Feb. 1920	July 1, 1920 to Feb. 28, 1921
Passenger revenue.....	\$777,236	\$693,780	\$6,345,329
Other revenue.....	27,256	23,452	242,045
Total.....	\$804,492	\$717,232	\$6,587,374
Operating expenses and taxes.....	753,459	773,585	7,039,877
Gross income.....	\$50,033	\$43,647	\$152,503
Income deductions.....	58,573	71,560	456,491
Net corporate income.....	\$7,540	\$127,913	\$908,994

NOTE:—Italics denote deficit.

Depreciation in San Francisco

Table Showing Full Depreciation Allowances for Municipal Railway and United Railroads

In the last issue of this paper a letter was published from the chief engineer of the city of San Francisco referring to the way in which the depreciation accounts for the Municipal Railway and the United Railroads of that city were treated in one of three tables published on page 697 of the issue of this paper for April 9. While the figures as printed were correct, they

addition to the sum included in the maintenance accounts. The wording of a footnote in the table as printed may have given the impression that the latter amount was the total amount charged to depreciation.

The accompanying table is a reprint of the table in question except that the sum of \$550,000 charged by the United Railroads to its depreciation reserve is now included in the operating account and the percentages and other figures are changed to fit this plan.

In connection with the above analysis of the operations of the Municipal Railways of San Francisco M. M. O'Shaugh-

Cleveland Traffic Decreasing

The report of the Cleveland (Ohio) Railway for March showed an ordinance surplus of \$41,335, of which \$28,234 was a tax refund due to a reduction in the company's valuation ordered by the state tax commission following a lengthy dispute. This ordinance surplus reduced the deficit in the company's interest fund, which is the fare barometer, from \$53,425 to \$12,090.

During March the company over-expended its maintenance allowance by \$19,686, making the total current deficit in the maintenance, depreciation and

COMPARISON OF OPERATIONS—YEAR ENDED JUNE 30, 1920

	United Railroads of San Francisco					Municipal Railway of San Francisco				
	Actual	Per C.-M. Cents	Per C.-H.	Per Cent of Operating Revenue	Per Cent of Operating Expense	Actual	Per C.-M. Cents	Per C.-H.	Per Cent of Operating Revenue	Per Cent of Operating Expense
Passenger revenue.....	\$8,938,987	34.85	\$3.08	99.30	.....	\$2,702,289	36.41	3.399	99.63	.....
Revenue from other railway operations.....	63,124	.34	.02	0.70	.....	10,147	.14	.013	.37	.....
Total operating revenue.....	\$9,002,111	35.19	\$3.100	100.0	.....	\$2,712,436	36.550	3.412	100.00	.....
Way and structures.....	423,853	1.651	\$0.145	4.69	6.08	\$102,130	1.374	\$0.128	3.76	4.06
Equipment.....	548,955	2.140	.189	6.09	7.88	186,947	2.520	.235	6.90	7.44
Depreciation.....	(a) 550,000	2.150	.189	6.11	7.90	378,429	5.099	.476	13.98	15.08
Total maintenance.....	\$1,522,808	5.941	\$0.523	16.89	21.86	\$667,506	8.993	\$0.839	24.64	26.58
Power.....	1,357,225	5.300	.467	15.05	19.52	348,383	4.700	.438	12.86	13.87
Conducting transportation.....	3,471,854	13.550	1.194	38.55	49.98	1,293,309	17.420	1.628	47.65	51.40
Traffic.....	.....	.....	.....	.....	.....	666	.009	.001	.03	.02
General and miscellaneous.....	695,874	2.720	0.240	7.72	10.00	202,554	2.730	.254	7.49	8.06
Add general miscellaneous comparison charge.....	.....	.....	.....	.....	.....	4,912	0.066	.006	0.16	0.19
Total general and miscellaneous.....	\$695,874	2.720	\$0.240	7.72	10.00	\$207,466	2.796	\$0.260	7.65	8.25
Credit transportation for investment.....	94,463	0.368	0.032	1.05	1.36	.....	.....	.....	.....	.....
Total operating expenses.....	6,953,298	27.150	\$2.394	77.29	100.00	\$2,517,330	33.918	3.166	92.83	100.00
Net operating revenue.....	2,048,813	8.040	.706	22.71	29.48	195,106	2.632	.246	7.17	7.76
Taxes.....	513,200	2.005	.176	5.17	7.37	226,535	3.058	.284	8.36	9.02
Net earnings.....	1,535,613	6.035	0.530	17.54	22.11	31,429	0.426	\$0.038	1.19	1.26
Revenue miles.....	25,610,023	.....	8.84	.....	.....	7,419,272	.....	9.32	.....	.....
Revenue hours.....	2,906,503	.....	.....	.....	.....	795,578	.....	.....	.....	.....

(a) Allowance from profit and loss account for the year. Italics indicate deficit.
The figures shown for way and structures and equipment also include in part some allowance for current depreciation.

may have been misleading to some owing to the difference in practice of the two systems in the way of treating the depreciation account. In the report of the Municipal Railway as given out by the city and as printed in the table, the full amount allowed for depreciation, 14 per cent of the passenger revenue, appears in the operating report. In the report of the United Railroads for the year ended June 30, 1920, \$550,000 was charged to the profit and loss account as a depreciation reserve in

nessy, chief engineer of the city, has submitted the accompanying figures.

The company, he states, has, besides building two car houses, extended the original 45 miles of track called for in the bond issues by 18 miles, so that at present there are 63 miles of operated trackage exclusive of 4 miles in car houses, sidings, etc.

The following figures do not take into account the comparison charges that are required by the city charter. These charges are about \$1,000,000.

renewal account \$222,361. The over-expenditure for the month of the company in its operating allowance was \$30,775, making the total current deficit in the operating account \$254,638.

These two deficits have now reached such a considerable sum that company officials say they will soon have to ask City Council for some sort of an adjustment, particularly in view of the fact that the company's maintenance allowance and its operating allowance were each reduced 1 cent a car mile on April 1 under the terms of the ordinance. The need is great for caring for these deficits speedily.

During March the company carried 35,900,733 riders, a decrease in traffic of 7.04 per cent over the same month a year ago. The February traffic decrease was about 4 per cent as compared with the previous year.

Although the company officials and Fielder Sanders, street railway commissioner, took steps to curtail service in proportion to the traffic decrease they could not keep pace with the rapidly declining number of car riders, as the number of car miles run in March was 3,157,360, a decrease of only 9.41 over the same month in 1920. Further curtailments of service, however, have been made during April.

The 20 per cent wage reduction accepted by the company's trainmen, effective on May 1, will result in a saving of approximately 1 cent a car mile.

FUNDS VOTED BY THE CITY

Bond Issues:	
Geary Street, 4 1/2 per cent bonds, dated July 1, 1910.....	\$1,900,000.00
Market Street, 4 1/2 per cent bonds, dated July 1, 1910.....	120,000.00
Municipal 5 per cent bonds dated Dec. 1, 1913.....	3,500,000.00
Contribution from General Taxes:	
From city and county of San Francisco during the fiscal years 1910 to 1915 inclusive, to meet interest on funded debt.....	\$239,901.83
Cost of bond election Dec. 30, 1909, and referendum election April 22, 1913.....	29,628.54
Provisional charges for legal and clerical services rendered by city employees.....	37,022.10

REVENUE RECEIVED

Total revenue received from the railway for eight years ending Dec. 31, 1920.....	\$15,078,490.49
Operating expenditures for same period.....	9,561,758.63
Net earnings, exclusive of taxes and depreciation.....	\$5,516,731.86

DISTRIBUTION OF NET EARNINGS

Interest on outstanding bonds.....	\$1,642,322.03
Redemption of maturing bonds.....	899,300.00
Extensions and betterments.....	1,188,150.20
Depreciation.....	1,266,832.01
Compensation insurance.....	156,628.69
Materials and supplies.....	150,578.72
Advanced to Twin Peaks Tunnel.....	82,152.57
Accidents, damages, etc.....	130,767.63
Total.....	\$5,516,731.86

Twenty per Cent Revenue Increase with Seven-Cent Fare

The income statement of the Philadelphia (Pa.) Rapid Transit Company for the months of February and March, together with the three months' period ended March 31, is shown in the accompanying table. Since the inception of the 7-cent fare in November, 1920, the Philadelphia Rapid Transit Company has realized a 20 per cent increase in revenue with a corresponding decrease in traffic of only 4.1 per cent. In connection with the record of traffic handled it is disclosed that the number of 3-cent exchange tickets sold decreased about 10 per cent and that joint rate passengers from foreign lines increased about 28 per cent. For the five months' period ended March 31, 1920, with the 5-cent fare in effect 12,644,723 more passengers were carried than in the corresponding period with the 7-cent cash fare and the four for a quarter ticket rate.

Financial News Notes

New Lease Approved.—A lease of the Medway & Dedham Street Railway to the Milford & Uxbridge Street Railway, Milford, Mass., has been authorized by the directors and stockholders, and approved by the Massachusetts Department of Public Utilities.

Assessment Still Under Protest.—The County Board of Equalization at Louisville, Ky., has reduced the tentative assessment of the Louisville Railway's property from its first figure of more than \$14,000,000 to \$9,000,000 flat. The previous assessment was \$4,000,000. The assessment of the Louisville &

Interurban Railway was not changed by the State Tax Commission, but remains at the same figure, \$1,750,000.

Court Orders Interest Payment.—The United States District Court recently ordered Joseph K. Choate, receiver of the Aurora, Elgin & Chicago Railroad, Aurora, Ill., to pay the coupon on the first 5 per cent bonds of that company, which was due on Oct. 15, 1920, together with interest thereon from that date.

Colorado Road Gives Up the Ghost.—The electric railway property of the Durango Railway & Realty Company, Durango, Col., is being dismantled. The company operated 2.5 miles of standard gage electric railway with five motor passenger cars. It is the first electric street railway in Colorado to give up the ghost.

Merger May Be Made Compulsory.—A bill which will permit the electric railways in Washington, D. C., to effect voluntarily the merging of their lines is being drafted in the District of Columbia committee of the House of Representatives. If prompt action does not follow the enactment of such legislation it is expected that another bill will be reported out promptly which would, in effect, compel the local companies to merge.

Capital Increased \$10,000,000.—Papers have been filed with the Secretary of State of West Virginia by the Monongahela Valley Traction Company, Fairmont, certifying to an increase in its capital stock from \$10,000,000 to \$20,000,000. The same company in filing with the New York Stock Exchange an application to list notes a change in name of the company from the Monongahela Valley Traction Company to the Monongahela Valley Traction & Light Company. It is understood that this change was made in order to indicate more accurately the field of operation of the company, which is engaged in railway operation, electric light and power service, mining coal and kindred activities.

Approval Sought for Purchase Financing.—To carry out its plans for the purchase of the Sacramento Northern Railroad the Western Pacific Railroad has applied to the California Railroad Commission for authority to issue \$4,180,000 of its first mortgage 5 per cent gold bonds. The bonds are to be exchanged for bonds of the Sacramento Northern now in the hands of a trustee. The Sacramento Northern bonds deposited for exchange amount to 90.906 per cent of the total issue. The bonds are to be exchanged on the basis of \$80 face value in Western Pacific bonds for \$100 face value of Sacramento Northern bonds. Of the Sacramento Northern stock issue 90.639 per cent, or \$4,065,094, has been deposited with the trustee. The Western Pacific is to pay \$27.50 a share for trust certificates representing first preferred stock, \$15 for trust certificates representing second preferred stock and \$6 for certificates representing common stock.

INCOME STATEMENT PHILADELPHIA RAPID TRANSIT COMPANY

Month Ended	1921	March 1920	Per Cent Change	February 1921	February 1920	Per Cent Change
Operating revenue.....	\$3,757,508	\$3,179,961	18.2	\$3,207,373	\$2,698,457	18.8
Operation and taxes.....	2,765,136	2,234,354	23.8	2,442,504	2,049,795	19.2
Operating income.....	\$992,372	\$945,607	4.9	\$764,869	\$648,662	18.0
Non-operating income.....	46,637	45,109	3.4	36,996	38,900	4.9
Gross income.....	\$1,039,009	\$990,716	4.9	\$801,865	\$687,562	16.7
Fixed charges.....	820,823	816,476	0.5	818,297	813,585	0.6
Net income or deficit.....	\$218,186	\$174,240	25.2	\$16,432	\$126,023	87.0
Three months ended March 31:						
Operating revenue.....		1921		1920		Per Cent Change
Operation and taxes.....		\$10,583,230		\$8,921,677		18.7
		7,878,546		6,499,627		21.2
Operating income.....		\$2,704,684		\$2,422,050		11.7
Non-operating income.....		121,226		123,997		2.2
Gross income.....		\$2,825,908		\$2,546,047		11.0
Fixed charges.....		2,461,362		2,446,666		0.6
Net income.....		\$364,546		\$99,381		266.5
5% return on P. R. T. paid in capital—Three months to March 31, 1921.....		\$375,000				
Amount by which gross revenues were insufficient to provide for operating expenses, taxes, fixed charges, and the 5% return upon P. R. T. Stock for the year ended Dec. 31, 1920.....		\$1,117,934				
		\$1,492,934				
Accumulated deficit for the fifteen-month period to March 31, 1921.....		\$1,128,387				

PASSENGER STATISTICS

March	Passengers 1921	Passengers 1920	Per Cent Change	Revenue 1921	Revenue 1920	Per Cent Change
7-cent fares.....	4,796,271	.....	.....	\$335,738	.....	.....
6-cent tickets.....	50,658,385	.....	.....	3,166,149	.....	.....
5-cent fares.....	.....	58,858,900	.....	.....	\$2,942,944	.....
3-cent exchange tickets.....	4,454,332	4,881,467	8.8	133,629	146,444	8.8
Joint rate passengers—foreign lines.....	728,297	667,891	9.1	29,908	21,271	40.5
Transfers.....	13,083,915	13,184,661	0.8	.....	.....	.....
Frees.....	397,173	460,982	13.8	.....	.....	.....
	74,118,373	78,053,901	5.0	\$3,665,426	\$3,110,660	17.8
Five months ended March 31:						
7-cent fares.....	27,316,031	.....	.....	\$1,912,122	.....	.....
6-cent tickets.....	241,613,470	.....	.....	15,100,841	.....	.....
5-cent fares.....	.....	281,574,224	.....	.....	\$14,078,711	.....
3-cent exchange tickets.....	20,968,808	23,353,740	10.2	629,064	700,612	10.2
Joint rate passengers—foreign lines.....	3,876,818	3,010,147	28.8	159,310	95,647	66.5
Transfers.....	61,952,081	62,778,117	1.3	.....	.....	.....
Frees.....	2,101,834	2,184,412	3.8	.....	.....	.....
	357,829,042	372,900,640	4.1	\$17,801,338	\$14,874,970	19.7

PASSENGER EARNINGS

	1920	1919	Per Cent Change
Ten months ended October 31.....	\$30,522,922	\$28,564,928	6.8
November.....	3,656,497	3,003,672	21.7
December.....	3,786,442	3,129,467	20.9
Total for twelve months.....	\$37,965,861	\$34,698,057	9.5
January.....			
February.....	3,552,152	2,987,814	18.8
March.....	3,140,821	2,643,357	18.8
	3,665,427	3,110,660	17.8
Five months ended March 31.....	\$17,801,339	\$13,874,970	19.7
Italics show decrease or deficit			

Traffic and Transportation

New Jersey Case Concluded Counsel Reserves Right of Appeal— Company Must Have Compensation Rate

Valuation of the property of the Public Service Railway, Newark, N. J., at \$125,000,000 or any other figure will not be considered by the Public Utility Commission in reaching a decision on the company's application for a 10-cent fare. The Utility Board made this announcement on April 22 when the rate hearing was resumed, although it was indicated at first that the valuation figures would be injected into the fare case.

That means the case will be decided along the lines laid down by Thomas N. McCarter, president of the railway; namely, a decision as to whether the company can continue operation on its present fare, regardless of the valuation of property. It is a clear-cut case of determining whether the company's operating expenses justify a 10-cent fare.

On the day that this decision was made the municipalities that would be affected by any increase in fare began the presentation of their side. George L. Record, counsel for Jersey City, introduced as a witness Walter Jackson, Mount Vernon, N. Y. Mr. Jackson testified as to his study of various rates of fare in other large cities, the effect of increases in rates upon gross receipts and upon the riding habit as shown by the index figure. He stressed more particularly the fact that while Boston had gone to a 10-cent fare the Boston Elevated, at least, had tried to increase the usefulness of the system to the public by operating 5-cent short haul lines. He also urged that any fare change that was made should contemplate the sale of tickets at reduced rates as a wise merchandising idea and that different self-sustaining rates of fare should be considered for different traffic districts.

The hearing was resumed on April 27 with Mr. Jackson again the witness.

The Public Service Railway called in rebuttal both Edward Dana, general manager of the Boston Elevated Railway under the public trustees, and W. J. Flickinger, assistant to the president of the Connecticut Company. Mr. Dana testified that the company was getting a reasonable return with a 10-cent fare. From 5 cents the rate with that company went respectively to 7 and 8 cents, but each time, he said, the company knew that it would not be enough return and continued its fight for a 10-cent rate.

At the conclusion of the case Edmund W. Wakelee, counsel for the Public Service Railway, said:

The Public Service Railway will ask the commission to fix such rate as it approves as a reasonable fare. The company stipulates that it will follow such a rate fixed by the board, at the same time reserving the right to test the validity of whatever rate may be fixed in the higher courts.

Present Fares Held Adequate

The Pennsylvania Public Service Commission refused to approve an increase in the rates of the Warren (Pa.) Street Railway previously established by the commission where it appeared that the applicant had always been in a financial position to pay an annual 6 per cent dividend. The new rate proposed by the company was a 7-cent cash fare, with ten tickets for 65 cents.

Zone Fare Works Well in San Diego Change from 5 Cents to a 10-Cent Zone System with 5-Cent Base Has Produced an Increase of 36.9 per Cent in Revenue

According to an advance copy of the annual report of the San Diego (Cal.) Electric Railway for 1920, furnished through the courtesy of E. J. Burns, "the zone system as operated in the city of San Diego has demonstrated conclusively that it is entirely reliable, free from objectionable complications and has produced very satisfactory financial results. Operations for the first nine months were reviewed in the ELECTRIC RAILWAY JOURNAL for Nov. 13, 1920.

CONTINUING, the report states significantly that:

The zone system did not disturb real estate values; was not responsible for lowering or raising of rents; and has not changed the population insofar as being directly or indirectly responsible for any congestion in the closely built-up sections of the city, or at the boundary lines of the inner and outer zones. In fact, 90 per cent of the building activities during the year 1920 was confined within the outer zone, and this is also true of contemplated future improvements.

FARE COLLECTION POPULAR AND FASTER THAN BEFORE

It should be understood that the San Diego system is not of the multi-fare collection type, but a true zone system in which but one collection is made for the entire trip. It has been found that the pay-leave plan for outbound traffic and the pay-enter plan for inbound traffic actually has speeded up collection and therefore permitted fewer cars to handle the peak-load traffic than

Reduced Fares Abolished

Reduced fares at a half-penny per mile with a minimum of a penny, which were applicable under the Tramway Act for persons defined as artisans, mechanics or daily laborers, have been abolished and uniform rates are now charged on all the city tram cars in Glasgow, Scotland. Under the order granted by the Ministry of Transport these rates will be in effect until Feb. 15, 1923, unless previously revoked by the Minister of Transport. Any further increase in fares made before that date will not affect the rates paid by workmen.

The abolition of the lower rates heretofore conceded to workmen was granted on the understanding that the corporation of Glasgow would not grant sums in relief of rates or otherwise to the common good until reasonable provision had been made for the proper repair, maintenance and renewal of the entire railway property.

was the case under the old method of operating pay-enter always, especially on cars with limited loading space. The pay-leave plan outbound is pleasing to the public inasmuch as it is not necessary to shift parcels or packages on boarding cars for the purpose of paying fares. As to pay-enter inbound, the only change due to the zone system was the issuing of identification checks which has worked out with no inconvenience or complications.

MORE REVENUE AND MORE RIDERS

The financial success of the zone system is indicated by the operating figures for the year 1920. The revenue received from the transportation of 20,909,587 cash fare and revenue ticket passengers under the zone system amounted to \$1,330,275 as compared with an amount of \$1,026,445, representing the revenue that would have

TABLE I—CASH FARE AND REVENUE TICKETS, SAN DIEGO ELECTRIC RAILWAY, YEAR ENDED DEC. 31, 1920
(Includer suburban lines)

Passeengers Carried	Cash Fare and Revenue Tickets	Rate	Amount
5c. cash fares.....	7,973,635	5c.	\$398,682
10c. cash fares.....	695,375	10c.	69,538
15c. cash fares.....	17,696	15c.	2,654
20c. cash fares.....	9,887	20c.	1,977
25c. cash fares.....	6,019	25c.	1,505
Total cash fares.....	8,702,612		\$ 474,356
Revenue tickets:			
Four-strip, two-zone ticket.....	8,139,734	7.5c.	\$610,480
\$4.00 calendar month book.....	484,127	7.2c.	37,766
Sixteen varieties of school and suburban line tickets.....	3,583,114	1.66c. to 20c.	\$207,673
	12,206,975		\$855,919
Grand total.....	20,909,587		\$1,026,445

been received from the same number of passengers based on the rates of fare that existed prior to Jan. 1, 1920, an increase of 29.6 per cent.

The revenue received per passenger under the zone system averaged 6.36 cents, as compared with an average of 4.91 cents based on rates of fare in effect prior to Jan. 1, 1920, making the average revenue per passenger increase 1.45 cents or 29.53 per cent. Table I, in the company's opinion, indicates that the California Railroad Commission was justified when it stated: "The adoption of the zone system is much more likely to secure to the company the necessary additional revenue than a flat increase," stating for its reason that "a large amount of short-haul business would be lost to the company under a flat increase."

Table II further backs up the foresight of the commission, for therein

sengers per car-mile increased from 5.76 to 5.83 and the revenue and transfer passengers combined from 6.70 to 6.89. The revenue per car-mile rose from 27.18 cents to 37.11 cents or 36.5 per cent.

MORE REVENUE PER CAPITA TO OFFSET PRIVATE AUTOMOBILES

It appears from the report that the banner riding year of San Diego was 1913 when a population of 67,700 was carried 27,156,415 times (including transfer rides) yielding a revenue of \$1,001,314, a riding index of 401.13 rides per inhabitant per annum and an average annual revenue of \$14.79 per inhabitant. During the following years there has been a steady decline in the car-riding index, due permanently to the great increase in private automobiles and temporarily to the jitneys which flourished for two or three years.

under the zone system, has some extra clerical duties.

ZONE FARE RESULTS EXCEED COMMISSION ESTIMATES

The engineers of the California Railroad Commission estimated that the financial results for the twelve months following the adoption of the zone system would provide approximately \$110,000 for fixed charges. As a matter of fact, the amount available for fixed charges was \$219,635 or about 100 per cent more than estimated. However, it should not be expected that the zone system of fares will have any control over expenditures made for maintenance, operation, depreciation, taxes, etc. It is a system of fares affecting revenue only; and, as will appear when the full financial figures come to hand, the company must be relieved of certain burdens, particu-

TABLE II—CLASSIFICATION OF CASH AND REVENUE TICKET PASSENGERS, SAN DIEGO ELECTRIC RAILWAY, YEAR ENDED DEC. 31, 1920

Rate of Fare	Passengers Carried Number	Per Cent	Revenue Collected Amount	Per Cent
1½c. to 2½c.....	763,005	3.65	\$19,909	1.50
3½c.....	1,691,060	8.09	53,414	4.77
5c.....	8,037,525	38.44	401,877	30.21
6½c. to 6½c.....	647,297	3.09	45,972	3.44
7½c.....	8,140,449	38.93	610,533	45.90
10c.....	985,892	4.71	98,591	7.41
12½c. to 15c.....	518,358	2.48	66,372	4.99
17½c. to 25c.....	126,001	0.61	23,607	1.78
Total.....	20,909,587	100.00	\$1,330,275	100.00

TABLE III—SHOWING POPULATION SERVED, REVENUE PASSENGERS CARRIED, REVENUE RECEIVED FROM PASSENGER TRANSPORTATION AND AVERAGE RIDES AND REVENUE PER CAPITA PER ANNUM, SAN DIEGO ELECTRIC RAILWAY

Year	Population Served	Revenue and Transfer Passengers	Passenger Revenue	Average Rides per Capita per Year	Average Revenue per Capita per Year
1913	67,700	27,156,415	\$1,001,314	401.13	\$14.79
1914	75,800	23,595,012	930,089	337.67	12.27
1915	80,600	27,587,239	992,552	342.27	12.31
1916	86,700	24,525,162	932,003	282.87	10.75
1917	90,000	21,973,154	892,166	244.15	9.91
1918	100,000	24,660,128	1,030,745	246.60	10.31
1919	105,000	23,936,680	1,021,362	227.96	9.73
1920	110,000	24,679,568	1,330,275	224.36	12.09

it is shown that the 5-cent fares or short-haul passengers consisted of 38.44 per cent of the total revenue passengers, and that they produced 30.21 per cent of the passenger revenue. Table II also shows that 50.18 per cent of the total passengers were carried on a fare of 1½ cents to 5 cents, an average of 4.62 cents per passenger, and that this class of fare produced 36.48 per cent of the revenue. Fares more than 5 cents consisted of 49.82 per cent of the passengers carried, and yielded 63.52 per cent of the total revenue, an average of 8.11 cents per passenger. The total number of revenue passengers carried in 1920 was 20,909,587 compared with 20,538,530 revenue passengers in 1919—an actual increase of 1.8 per cent despite the combination of higher fares and declining activity. Indeed, it is interesting to point out that the figures for 1919 compared unfavorably with 1918 when the average fare was about the same but when war camps had stimulated the traffic to a total of 21,517,796 revenue riders.

Further, a comparison of 1920 with 1919 shows that transfer passengers increased from 3,398,150 to 3,769,981 or nearly 10 per cent, proving that no privileges in that direction were withdrawn by the zone fare. The increase in revenue was from \$971,174.04 to \$1,330,275.54, an increase of 36.9 per cent. The number of car-miles increased in lesser ratio than the traffic (from 3,572,836 car-miles to 3,583,758 car-miles) as shown by the fact that the cash fare and revenue ticket pas-

The zone system compared with the 5-cent year (1919) immediately preceding has had at least the satisfactory result of preventing any perceptible decline in riding due to increased fares, while raising the average annual revenue per inhabitant to a higher figure, \$12.09, than it had been since the period 1914-1919. This is clearly brought out in Table III.

SALES COMMISSION TO PLATFORM MEN EQUALS 7.17 PER CENT BONUS ON WAGES

A second reference to Table II shows that fare collection on the San Diego zone system is facilitated by the great proportion of convenient cash and ticket fares. Thus of the total, 38.44 per cent were 5 cents cash and 38.93 per cent were 7½-cent ticket, the latter being good for the same two-zone and inter-zone transfer ride as 10 cents cash. The high percentage of these "four for 30 cents" tickets is due to their being sold by the conductors on a basis of 3 per cent commission which is divided among all platform men in proportion to the number of platform hours worked by each man. The sales commissions distributed during 1920 as separate checks amounted to \$22,220 or 3.167 cents per platform hour. This represents a bonus of 7.17 per cent over the regular average wage of 44.128 cents an hour. It may be of interest to add that certain duties, such as turning trolley poles, seats, dash signs and tail lights are now expected of the motorman, as the conductor,

largely paving, before it can show a better return than 3.34 per cent on the investment.

Jitney Regulation Proposed in Birmingham

Regulation of Jitneys operating in Birmingham, Ala., is up before the City Commission and it is probable that some form of ordinance requiring liability insurance will be adopted. City Attorney Fred G. Moore is now working out an ordinance to be presented to the commission for action. Regulations adopted by a number of other cities and suggestions by local citizens and civic organizations are being studied before final drafts of the ordinance are prepared.

At a recent meeting of the commission an ordinance was introduced by Commissioner H. P. Burruss providing for regulation of the jitneys. The ordinance was in form of a suggestion to the commission and Mr. Burruss asked that it be referred to the City Attorney to form the framework for an ordinance to be adopted.

Liability insurance in the sum of \$5,000 in the case of an accident resulting in the injury or death of one person and of \$10,000 in the case of the injury or death of any number of persons was provided in this ordinance. It also provided for the protection of jitney passengers as well as a pedestrian and other vehicles.

Vigorous protests against the adoption of the ordinance or any similar or-

dinance were made by a number of jitney operators. They maintained that the insurance would be prohibitive, though it was provided in the original ordinance that any number of cars operated by a single owner could be protected under a single policy.

The proposal to regulate the jitneys and require insurance has been endorsed by a number of the local civic organizations. It is probable that the final ordinance will provide for insurance protecting pedestrians and other traffic but not jitney passengers.

Ignorance of Hassenpfeffer Kills Ordinance

After more than an hour of debate at the last meeting of the City Council of Toledo, Ohio, an ordinance proposed by Commissioner Wilfred E. Cann barring dogs—except crated or lap dogs—from city street cars was laughed down and defeated.

Regular fares have been charged for dogs but recently a conductor was bitten by an unruly dog and complaint was made against all of the canine family.

Councilman Dominick Foy proposed an amendment which would permit dogs muzzled and leashed to be carried during the hunting season. Another councilman went to bat for dog fanciers and championed the Airedale, of which Toledo family President Harding's "Laddie Boy" is one of the most famous. Another member challenged the statement that the Airedale was a "hunting dog" or a "one-man dog."

When an assistant law director drafted the amendment permitting dogs to ride for full fare during the "hunting season" he made plain that he didn't know what hunting season was meant—hassenpfeffer, squirrel, muskrat or anything else.

The amendment carried, however, and then the whole question was voted down and dogs will continue to enjoy street car rides as regular 6-cent passengers.

Sustains Ten-Cent Fare

Supreme Court Justice MacCrate in Brooklyn on May 2 denied the application of the city for an injunction restraining Lindley M. Garrison, receiver of the Brooklyn Rapid Transit Company, Brooklyn, N. Y., from continuing to charge a double fare on the Broadway, Reid Avenue, Wilson Avenue, Franklin Avenue and Smith Street car line. The court said:

The determination of the Public Service Commission, after hearings, is that these lines are now unprofitable. An injunction may mean their discontinuance. It seems to me better that the public should be transported than that they should be forced to walk.

The 10-cent fare was permitted on these lines on March 12. The city claimed it was illegal. The Brooklyn Rapid Transit contended that one fare could be charged for a ride within the old city limits and another for the continuance of a ride to outlying districts.

Transportation News Notes

Fares Declared Lawful.—The Interstate Commerce Commission held on April 26 that the one-way round-trip and commutation fares between stations on the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., were not unreasonable or otherwise unlawful. The complaint was made by the commuters' club.

Advertising Campaign in Dallas.—The Dallas (Tex.) Railway is conducting a publicity campaign at this time with the object of improving service and eliminating any dissatisfaction among patrons of the company. The campaign is under the direction of Dan Fisher, assistant to President J. F. Strickland. Extensive newspaper advertising is being employed, in addition to personal work among the trainmen and large display posters in the cars.

Higher Fares Asked in Helena.—The Helena Light & Railway Company, Helena, Mont., recently petitioned the Railroad & Public Service Commission for a 10-cent fare in the city of Helena and 15 cents in East Helena. The company also asks permission to sell commutation tickets at the rate of forty for \$2, to be used within city limits. The present rate of 7 cents with 6¢ cents where tickets are used went into effect on July 1. The company in its petition declares that this award of the commission was not sufficient to net the railway a reasonable return.

Motormen and Conductors Praised.—W. H. Sawyer, president of the Alton, Granite & St. Louis Traction Company, Alton, Ill., in a letter to the superintendent of transportation and roadway, has complimented the motormen and conductors for their co-operation in the safety work which has been under way for some time. Statistics were prepared and definite figures show that real results are being produced. Comparing the year 1917 with 1920 the total number of accidents has been reduced approximately .23 per cent despite the fact that accidents due purely to automobiles have increased 50 per cent.

Action on Fargo Fare Expected.—The North Dakota Railroad Commission recently arranged to take final action on the question of rates charged by the Northern States Power Company, Fargo, N. D., on its railway. The present 7-cent rate now in force in Fargo, village of North Fargo, N. D., and Moorhead, Minn., became effective last June when the commission ruled that the new rate was temporary pending final determination of the company's property valuation. The justification

for continuing the 7-cent rate will depend upon the railway's income and expense accounts which will be reviewed in detail at the coming hearing.

Interurban Rate Increased.—The Public Service Commission has authorized the Interstate Public Service Company, the Indianapolis & Louisville Traction Company, the Louisville & Southern Indiana Traction Company and the Louisville & Northern Railway & Lighting Company to increase their passenger fare rates basis from 2½ to 3 cents a mile. These companies all operate a continuous line between Indianapolis and Louisville and their petition said that all other electric traction companies in the State are receiving 3 cents a mile for passenger service and that railroads were receiving 3.6 cents a mile.

Suburban Line Increases Fare.—Under an order issued by the Public Utilities Commission the Northern Ohio Traction & Light Company, Akron, Ohio, began the collection of a 20-cent fare between New Philadelphia and Uhrichsville on March 7. The former rate was 10 cents. The change in fare follows an application filed by the company six weeks ago. The county grant expired at that time and March 7 the city grant at Uhrichsville expired. Negotiations have been going on for some time looking toward a new franchise, but so far no agreement has been reached. Patrons of the line paid the fare without complaint. Recently the company has been conducting an advertising campaign along the line showing the cost of carrying passengers. These figures indicated that a 20-cent fare was necessary. The distance is ten miles.

Suburban Line to Increase Fare.—J. F. Strickland, president of the Texas Electric Railway and also president of the Dallas (Tex.) Railway, announces that fare on the Trinity Heights line, which consists of suburban service through the Trinity Heights addition to the city of Dallas operated over the lines of the Texas Electric Railway, will be increased. The present fare to Trinity Heights is 5 cents, the rate not having been increased when the fares in the city of Dallas were raised to 6 cents. Although the Trinity Heights service is operated over the lines of the Texas Electric Railway the Trinity Heights cars traverse the tracks of the Dallas Railway down town and across the Trinity River bottoms to Oak Cliff, where they leave the rails of the Dallas Railway for the Texas Electric Railway. The contract under which the service to Trinity Heights was established about two years ago has expired and a new contract must be negotiated with the Dallas Railway for the use of its tracks, and Burr Martin, vice-president and general manager of the Texas Electric Company, and Richard Meriwether, vice-president and general manager of the Dallas Railway, are now negotiating for a new contract. The fare increase will be started at the time the new contract goes into effect.

Personal Mention

Noted Engineer President

W. S. Lee, Formerly Vice-President, Has Been Chosen to Head Piedmont & Northern Railway

William S. Lee, Charlotte, N. C., has been elected president of the Piedmont & Northern Railway by the directors of that property. Mr. Lee, for some time vice-president, succeeds the late Z. V. Taylor.

Mr. Lee is vice-president and chief engineer of the Southern Power Company, Charlotte, N. C., a position he has held since 1905 when the company took over other power companies and purchased larger power rights. In this capacity, with the financial assistance

About a year ago Mr. Lee established a consulting engineering office in New York. He already had an engineering staff in Charlotte which now works in conjunction with the New York office.

Mr. Lee was born in Lancaster, S. C., on Jan. 28, 1872, and was graduated from the South Carolina Military Academy in 1894. His early experience was with the Anderson Water, Light & Power Company, Anderson, S. C., where he was engineer in charge of the construction of the Portman Shoals hydro-electric plant. There he placed in service in 1898 the first 11,000-volt generator to be installed in America. His record also includes association with other power companies. Many of these companies have since been taken over by the Southern Power Company.



W. S. LEE

of J. B. Duke as president of the organization, he has designed and constructed eight hydro-electric plants and four steam stations with an aggregate capacity of 280,000 kva.

It is rather interesting to note that Mr. Lee's first practical experience was as resident engineer with a small street railway in South Carolina, which later he left to take up work dealing with power generation. Now one most naturally associates his name with water-power development and electrification of industries in the South, where his leadership and engineering ability have accomplished marvels.

Under Mr. Lee's direction, the Piedmont & Northern Railway has been built up since 1911 so that now it is a system operating 130 miles of track. A high-speed interurban service is furnished, operated at 1,500 volts direct current from the Southern Power Company's system.

The standards devised by Mr. Lee through experience in pioneer design and installation of power transmission equipment have been widely reflected in the practices of other large companies.

R. W. Meade Resigns as President of Detroit Motorbus Company

Richard W. Meade has resigned as president and general manager of the Detroit (Mich.) Motorbus Company. He formerly was president and general manager of the Fifth Avenue Coach Company, New York. Mr. Meade has been responsible for providing in Detroit urgently needed motor transportation facilities by supplying a service similar to that which has proved so useful and popular in New York. The present scope of the system and the results of seven months' operation formed the basis of an article in the issue of the *ELECTRIC RAILWAY JOURNAL* for April 23.

Mr. Meade has made no definite plan for the future as yet, but he expects to remain in the bus business, in which he sees a great future. He will not, for the present at least, resume his connection with the Fifth Avenue Coach Company.

Mr. Meade was formerly a street railway man, at one time having been connected with the Metropolitan Street Railway, New York, now the New York Railways, as assistant to the president. His previous experience also includes long service in steam railroading.

H. M. Addinsell, Chairman of P. S. Securities Committee

H. M. Addinsell, of Harris, Forbes & Company, has been appointed chairman of the Public Service Securities Committee of the Investment Bankers' Association of America. Mr. Addinsell, whose appointment was announced by Roy C. Osgood, president of the association, succeeds O. B. Willcox, who recently resigned from the board of governors. Pierrepont V. Davis, of the National City Company, was appointed chairman of the Railroad Securities Committee.

Steam Road Man Chosen

F. H. Wilson of N. Y. C. Elected President of Cleveland, Southwestern & Columbus Railway

Frank H. Wilson, for thirty-three years connected with the New York Central and Big Four Railroads, was elected on April 26 to fill the position of president and general manager of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio. He will fill the vacancy created at the first of the year by the resignation as president of F. E. Myers of Ashland, Ohio, to become chairman of the directorate.

Mr. Wilson becomes general manager of the Cleveland, Southwestern & Columbus Railway as well as the president because of the continued ill health of E. F. Schneider, general manager. Because of the condition of his health Mr. Schneider was given a three months' leave of absence, which is about to expire. Mr. Schneider says he believes he can resume some sort of work,



F. H. WILSON

while the officers of the company feel that it will be necessary for Mr. Wilson to act as general manager, although Mr. Schneider will be retained in some sort of a capacity.

Mr. Wilson is a steam road man who came up from the ranks. He began his railroad career in Indianapolis as a messenger boy for the Indiana, Bloomington & Western Railway in 1887. He spent the next sixteen years climbing from one position to another in the service of the Big Four.

Ten years ago he went to the New York Central lines as assistant general superintendent of the Lake Shore and Michigan Southern Railway, and four years ago was promoted to the position of general superintendent of the Cleveland district, embracing New York Central territory from Buffalo to Toledo and south. When Mr. Myers resigned Jan. 1 the directors appointed a committee to hunt for a man to take his place and on the recommendation of the committee the election was made.

Otto Miller, of Hayden, Miller & Company, was elected a member of the board and made chairman of its executive committee.

President Devlin Leaves California Commission

President Frank R. Devlin of the California State Railroad Commission on April 26 resigned his position on account of his desire to return to general practice of law, in which he had been previously engaged for eighteen years. Mr. Devlin formerly was district attorney of Solano County, Cal., where he had also served as superior judge. He was a member of the 1911 California State Legislature. Mr. Devlin succeeded E. O. Edgerton as president of the commission when the latter's term expired recently. Chester H. Rowell replaced Mr. Edgerton on the Commission.

H. Stanley Benedict of Los Angeles, an attorney and former member of the State Legislature, and an active member of the State Board of Control with offices in Los Angeles and Sacramento, has been appointed to membership on the State Railroad Commission as a successor to Mr. Devlin. Mr. Benedict has been a resident of Los Angeles for 35 years and has been prominently connected with state projects, offices and politics.

Successful Mediator on California Commission Resigns

After opening and for eight years managing the Los Angeles office of the California State Railroad Commission, Miss Janet Converse on April 26 tendered her resignation to the Railroad Commission in San Francisco. That credit for the highly successful work of the commission in southern California is due Miss Converse was the finding of a committee which recently made a survey of that commission. She is now resigning to engage in business for herself in the field of industrial surveys and public relations.

In the eight years Miss Converse has been in charge of the Railroad Commission's work in southern California, she has adjusted more than four thousand informal complaints without a court hearing before the commissioners. Her policy of inviting parties to a dispute over public service to come to her office and there discuss the subject freely and openly has done much to promote proper understanding between utilities and regulatory bodies and the public. Such conferences have brought executives of the utilities in direct touch with complainants.

Absence of a standard of service for street railways and other public utilities in many communities shows an important work which can benefit both the public and the public utility companies, according to Miss Converse and it is to this subject she will devote her energies. Each man in a city has a different idea of the service the street railway should render and a different complaint to be made to regulatory bodies. This situation presents many difficulties and can be met best by some organization or agency acting independently in a survey of conditions in communities where no standard exists.

Miss Converse was well experienced in organization work when she became secretary of the Southern California Railroad Commission, having had the honor of directing the first woman's political campaign in Los Angeles.

Mr. Mathews Leaves B. R. T.

Superintendent of Surface Roadway in Brooklyn Takes Like Position with Third Avenue Railway

E. L. Mathews has resigned as superintendent of surface roadway of the Brooklyn (N. Y.) Rapid Transit Company to take up similar duties in the maintenance organization of the Third Avenue Railway, New York.

Before going to Brooklyn in 1908 Mr. Mathews served some ten years as superintendent of construction for contracting and engineering firms in Baltimore, Md., and was in charge of the rebuilding of a number of street railway lines in that city. Later he was superintendent of construction during the building of the Philadelphia & Western Railway, Norristown, Pa. In 1907 he made an extensive physical examination of the street railways in San Francisco for the firm of Newhall & Company, just prior to the merger of a number of properties there.

In 1908 Mr. Mathews organized the track department of the Coney Island & Brooklyn Railroad, Brooklyn, N. Y., and later became engineer of way and structure for that company, holding this position until the merger with the Brooklyn Rapid Transit System. Entering the way and structure department of the latter company as assistant engineer in charge of maintenance in 1915 he ultimately took over the active field direction of the surface maintenance with the title of superintendent of surface roadway.

State's Directors of Providence Railway Appointed

Governor San Souci of Rhode Island on April 20 sent to the Senate the appointments of Zenas W. Bliss, of Cranston, and George H. Newhall, of Providence, as directors of the United Electric Railways, Providence, R. I.

Mr. Bliss, who is chairman of the State Tax Commission, is now president of the temporary organization of the trolley corporation. Mr. Newhall, state bank commissioner, is the present treasurer of the temporary company.

These appointments are made by the Governor under the act incorporating the United Electric Railways, passed by the legislature two years ago which provides that there shall be two members of the board of directors representing the state.

C. E. Hart has been named chairman of the Findlay (Ohio) Street Railway Commission which took charge of the operation of the cars under a cost-plus form of franchise recently approved for that city. Eight-cent fares are in effect, but the commission

warned citizens to support the lines or an advance to 9 cents would become effective in three months.

J. H. Libbey, who recently resigned as engineer of power and electric lines of the Eastern Massachusetts Street Railway Company, has become connected with H. M. Haven and William W. Crosby, engineers and architects, Boston, Mass.

Obituary

H. S. Graham

Howard S. Graham, president of the Washington-Virginia Railway, Washington, D. C., died on April 10. Mr. Graham was very active in public utility work and was also a banker and broker of great energy and enterprise.

He was probably best known as senior member of the banking and brokerage firm of Graham, Parsons & Company, with offices in both Philadelphia and New York. He had been actively engaged in this line of business for many years and his equitable business policies and integrity of purpose had secured for him a warm and sincere friendship in the various walks of life.

Hardin H. Littell

Hardin H. Littell, seventy-one years old, formerly general manager of the Louisville (Ky.) Railway, died suddenly on April 28 at his home in Buffalo, N. Y., where he had been president and general manager of the Buffalo Railway. He was one of the organizers and the first president of the American Electric Railway Association and was recognized as one of the most capable railway men of America.

Entering the service of the Louisville Railway when 17 years old, Mr. Littell rose rapidly through merit of his ability. He resigned in 1891 to become head of the Buffalo car system.

Born in Corydon, Ind., Mr. Littell attended the country schools of Harrison County until 12 years old. He began his business career as a clerk in a drygoods store, later going with a jewelry store.

In 1864 Mr. Littell became office boy in the office of the late Gen. J. T. Boyle, who first successfully organized a street car system in Louisville. At the age of 22 Mr. Littell was made superintendent. After leaving Louisville Mr. Littell served as president of the Buffalo, Bellevue & Lancaster Railway and president of the Cincinnati (Ohio) Inclined Plane Railway.

He was one of the largest stockholders in the Louisville Railway Company and served as a director until the management was changed a year ago. He retired from business some years ago following the sale of the Buffalo Railway to the International Traction Company.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Spring Buying of Rail Bonds for Maintenance

Large Producer Reports Demand Ahead of Last Year; Others Find Less Activity

Although one of the largest rail bond manufacturers reports a demand that on the whole is normal and perhaps even a little heavier than last year, other producers do not find the market especially active this spring. One factor in the buying that is noted by all interests is that electric railways are not stocking rail bonds heavily and are ordering almost entirely for maintenance work rather than on behalf of new track construction.

Whereas most producers, however, state that maintenance buying is down to the lowest possible minimum, the exception heretofore noted reports that, inasmuch as repairs to bonds and other track equipment have been neglected so much in the past, there is a large amount of work that absolutely has to be done this year. Rail bond business so far as coal mines are concerned is far below normal, for with the present slack operating conditions in the soft coal industry buying from that source is light.

Stocks of the finished product are not uniform. Some producers have good stocks on hand and can make immediate shipments, but several others do not follow a policy of stocking as a general rule and hence are quoting deliveries of one to three weeks. Production is curtailed at present, though at least one of the leading manufacturers is proceeding to build up a sizable stock. This action may possibly be influenced by the steadiness of copper prices which have shown some tendency to firm slightly.

Rail bond prices have not changed since the first of last December, when an increase of 5 points in the discount, following several previous recessions from the peak price, brought the quoted discount to its present level of 25 per cent. The opinion is generally expressed that prices have reached bottom in view of the position of the copper market.

Steel Corporation Announces Wage Reduction

The United States Steel Corporation, through Judge E. H. Gary, on May 3 announced a wage reduction of 20 per cent, effective May 16, in the pay of day laborers at the manufacturing plants. Since the reduction in price of steel by the corporation a few weeks ago, the question of a wage reduction has been thought by the trade to be merely

a matter of weeks. Announcement is also made of a reduction in the hours of production per day. In some departments the twelve-hour day has been abandoned and efforts are being put forth to extend this to all departments before the year is out. Other mills have experimented with the 8-hour day innovation with satisfactory results.

Trolley Wire Production at 50 per Cent of Capacity

Though Present Buying Is Only for Maintenance, Producers Are Hopeful of Improved Demand Soon

Conditions in the market for trolley wire are apparently uniform with virtually all producers. The general practice is to cut overhead to a minimum and wait for business to open up. Accordingly operation in most cases is at only 50 per cent of capacity, this curtailment being accomplished by operating but three days a week in some cases and by reducing labor forces in others.

Despite this reduced output stocks of trolley wire with those producers who normally carry a surplus supply, are in ample shape to make immediate shipment on such orders as are coming in. Many producers, especially of plain copper trolley wire, do not usually stock their product, and in these instances orders can be filled in about one week.

Buying is only for repairs and light at that. Producers report that electric railways are not stocking trolley wire to any extent, in fact, because of the delivery situation this is not necessary, and as there are few if any new extensions under way, orders cover only essential maintenance needs and nothing more. There is general optimism expressed by wire manufacturers, however, that an improvement in business in this line is not too far distant. Although the spring is normally the buying season for trolley wire there is a general view that starting with the summer better buying will be felt. The basis for this optimism is largely the good potential market and the possibility of relief from the pressing question of labor readjustments in the industry.

Prices of trolley wire have held steady for quite some time and in view of the low position of copper with its slight tendency to firm in price recently, it seems questionable if quotations can go much, if any, lower. Producers are generally quoting on a 15-cent base though one manufacturer whose product is not all copper is on a 14½ cent base.

Manufacturers Have Low Stocks of Turnstiles

Railways Have Not Entered Market, but Good Demand from Amusement Parks Has Reduced Supply

Prices of turnstiles are still virtually at the peak level of last year, producers report. The chief item in the cost of manufacture is labor, and labor costs in this field, it is stated, are no lower except as greater efficiency of workmen serves to reduce expenses. The price element is not thought to be an important factor in the light buying of turnstiles this spring, however, as there is said to be little likelihood of any decrease in price being made this year.

The main factor in the market is the fact that electric railways have not the money to make new extensions such as building stations and terminals where turnstiles would be used. There is some buying of repair parts of course but as there is never much call for replacements of the finished product the market this spring falls far below that of other years. On the other hand, a good demand has resulted from privately-owned amusement parks and this has either cleared out manufacturers' stocks or reduced them to very low levels.

The general policy now is not to stock turnstiles. Consequently, some producers are turning out this product only on order while others could produce twice as many machines as at present, if it were necessary. Deliveries are not from stock, for the good reserve supply that was built up during the past winter has been exhausted, but at the same time shipments can be made promptly. Inasmuch as turnstiles are largely a seasonable spring product, there does not seem much prospect that the market will open up very much later this year.

Toronto Places \$1,270,000 Order for New Cars

The Toronto Transportation Commission, which will have jurisdiction over the operation of the Toronto Railway system when the franchise expires next September, at a meeting on April 26 awarded a contract to the Canada Car & Foundry Company, Montreal, for 100 motor and 60 trailer cars amounting to about \$1,270,000, exclusive of the electrical and air-brake equipment. It is expected the latter equipment will be purchased either from Canadian or British firms or possibly both. Bids on the car bodies were received from several car manufacturers in the United States, but when exchange rates were taken in-

to consideration the bids submitted were not considered favorably.

The cars will have all-steel bodies. The motor cars will be 51 ft. 8 in. long and 8 ft. 6 in. wide while the trailers will be 49 ft. long and the same width as the motor cars. The seating capacity of the motors will be 57 passengers and the trailers will seat 61. General Manager H. H. Couzens states that a substantial number of the cars will be delivered by the first of next September.

The seats will be of wooden slats; windows of plate-glass and the lower panels in the doors of wired glass. The price for both types is considerably below the original figures received by the Commission. The first estimates were about \$27,000, and it is expected that the cars will be placed in service next fall at a final cost of between \$17,000 and \$18,000 each. Though the contract has been awarded, the Transportation Commission, to comply with the law, must submit the specifications and design for the approval of the Ontario Railway and Municipal Board. This will be done immediately.

Electrification Planned in Jamaica

A \$10,000,000 project for the electrification of the Government Railway is planned by the Jamaican Government, according to the *Times Trade Supplement*, London. Of this amount it is said the pipe and conduit lines will cost about \$2,000,000, on which a 5 per cent saving can be effected by buying from the United States. Seven substations at a cost of \$800,000 are suggested, while trolley wire, feeders, transmission and communication lines will total \$4,000,000. Twenty-one electric locomotives are estimated at \$1,250,000.

Stock Deliveries of Metal Culverts

Railway Buying Small Compared with Highway Demand—Prices Drop 35 to 40 per Cent This Year

Demand for metal culverts with both steam and electric railways does not shape up very large in comparison with the general culvert business, producers report. Some inquiries are received and a few orders are being placed, and though even this spring the railway demand is probably better than has been the case for the past few years, it is by no means up to the old standard of before the war. Culvert manufacturers apparently believe that a large potential market exists in the railway field, however, as some of them are doing considerable circularizing and advertising there.

At the beginning of this year the culvert business looked good in view of prevailing lower prices, better railroad facilities, improved operating conditions and quicker deliveries. Since then there seems to have been a general slowing down of buying, though the demand from highways still causes total sales to hold up to about normal volume if we eliminate from consideration the abnormal demand of last year. Producers are quite generally optimistic that the present year on the whole will yield good results. Extensive road building programs are under way throughout the country, though the work is temporarily set back awaiting a new congressional appropriation for Federal aid in road building.

Little possibility is seen that deliveries will be in anywise pushed for long to come. Stocks of finished culverts are being kept up well so that immediate

shipments can be quoted on standard material at present, while sheet mills are keen for business and compete with each other in giving culvert manufacturers prompt shipments. There is likewise considerable competition among culvert producers for large orders, even for those which yield only a small margin so that plants may be kept running at the present normal rate of operation.

Prices in this market are decreasing in an orderly way commensurate with the drop in material costs. A representative producer who increased prices from 15 to 25 per cent during 1920 has lowered quotations from 35 to 40 per cent thus far this year. In general culvert prices are on a very reasonable basis compared with pre-war prices.

Rolling Stock

The United Railways and Electric Company of Baltimore, Md., on April 25 placed an order with the J. G. Brill Company for ten safety cars.

Municipal Railway of San Francisco, Cal., is making final arrangements to purchase thirty light-weight, single-truck, center-entrance street cars. They will be 29 ft. long, will weight 13 tons, and will be equipped with two 50-hp. motors.

Worcester (Mass.) Consolidated Street Railway Company is equipping twenty of its regular double-truck cars for one-man operation. The cars, which are being refitted in the company's own shops, will not be equipped with standard safety devices. A manual door controlling handle and an original safety device for passengers to release the car doors by pulling a lever if necessary, are being installed.

NEW YORK METAL MARKET PRICES

	Mar. 30, 1921	May 4, 1921
Copper ingots, cents per lb.	12.75	12.62½
Copper wire base, cents per lb.	15.00	14.50
Lead, cents per lb.	4.10	4.75
Nickel, cents per lb.	41.00	41.00
Zinc, cents per lb.	5.15	5.45
Tin, cents per lb.	29.37	31.87½
Aluminum, 98 to 99 per cent, cents per lb.	28.00	28.00

OLD METAL PRICES—NEW YORK

	Mar. 30, 1921	May 4, 1921
Heavy copper, cents per lb.	9.50 to 10.25	10.00 to 10.50
Light copper, cents per lb.	7.00 to 8.50	7.50 to 8.00
Heavy brass, cents per lb.	5.50 to 5.75	5.50 to 5.75
Zinc, old scrap, cents per lb.	2.87 to 3.00	2.87 to 3.00
Yellow brass, cents per lb.	4.00 to 4.25	3.75 to 4.00
Lead, heavy, cents per lb.	3.25 to 3.50	3.75 to 3.90
Steel car axles, Chicago, per net ton.	14.50 to 15.00	14.00 to 14.50
Old car wheels, Chicago, per gross ton.	13.50 to 14.00	13.50 to 14.00
Steel rails (short) Chicago, per gross ton.	12.00 to 12.50	13.00 to 13.50
Steel rails (rerolling), Chicago, gross ton.	12.00 to 12.50	12.50 to 13.00
Machine shop turnings, Chicago, net ton.	5.50 to 6.00	5.00 to 5.50

ELECTRIC RAILWAY MATERIAL PRICES

	Mar. 30, 1921	May 4, 1921
Rubber-covered wire base, New York, cents per lb.	16.50	16.00
Weatherproof wire base, New York, cents per lb.	17.50	15.50
Standard Bessemer Steel Rails, per gross ton.	45.00	45.00
Standard open hearth rails, per gross ton.	47.00	47.00
T-rail, high (Shanghai), per gross ton, f.o.b. mill.	.....	.....
Rails, girder (grooved), per gross ton, f.o.b. mill.	.....	.....
Wire nails, Pittsburgh, cents per lb.	3.00 to 3.25	3.25
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.65	3.40
Tie plates (flat type), cents per lb.	2.75	2.75
Tie plates (brace type), cents per lb.	2.75	2.75
Tie rods, Pittsburgh base, cents per lb.	6.00	6.00
Fish plates, cents per lb.	2.75	2.75
Angle bars, cents per lb.	2.75	2.75
Rail bolts and nuts, Pittsburgh base, cents per lb.	5.00	4.50
Steel bars, Pittsburgh, cents per lb.	2.00 to 2.35	2.10
Sheet iron, black (24 gage), Pittsburgh, cents per lb.	3.70 to 4.20	3.85
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.	4.55 to 5.25	4.55
Galvanized barbed wire, Pittsburgh, cents per lb.	3.85 to 4.10	4.10

	Mar. 30, 1921	May 4, 1921
Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.70 to 3.95	3.70
Car window glass (single strength), first three brackets, A quality, New York, discount*	77%	82%
Car window glass (single strength), first three brackets, B quality, New York, discount.	77%	82%
Car window glass (double strength, all sizes, A quality), New York, discount.	79%	83%
Waste, wool, cents per lb.	11 to 17	11 to 17
Waste, cotton (100 lb. bale), cents per lb.	9.00 to 13.00	9.00 to 13.00
White Colored.	7.00 to 11.00	7.00 to 11.00
Asphalt, hot (150 tons minimum), per ton delivered.	40.00	33.00 to 35.00
Asphalt, cold (150 tons minimum, pkgs. weighed in), per ton.	36.00	33.00 to 36.00
Asphalt, filler, per ton.	36.00	36.00
Cement, New York, per bbl.	3.50	3.20
Linseed oil (raw, 5 bbl. lots), New York, per gal.	.68 to .70	.63
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	.70 to .72	.65
White lead (100 lb. keg), New York, cents per lb.	.13	.13
Turpentine (bbl. lots), New York, per gal.	.54	.67 to .68

* These prices are f.o.b. works, with boxing charges extra.

Recent Incorporations

Texas Interurban Railway, Dallas, Tex.—The Texas Interurban Railway of Dallas, Tex., has been granted a charter by the Secretary of State at Austin. This is the company organized by the Strickland interests for the building of an interurban line from Dallas to Terrell, under the commitments made in the charter granted by the city of Dallas in 1917. The company is capitalized for \$2,500,000, and the purpose as given in the charter is to construct and operate an electric interurban line from Dallas to Terrell, Tyler, Greenville, Paris and Denton. The incorporators are J. F. Strickland, C. E. Calder and C. W. Hobson. Other directors are: R. L. Thornton, Dallas; Walter Allen, Terrell; L. E. Griffith, Terrell; L. J. Rodney, Forney; J. C. Rugles, Mesquite; Schuyler Marshall, Mesquite. J. F. Strickland, president of the company, said that only the Terrell line would be built now, but that the company later may undertake the construction of other lines as provided for in the charter.

Track and Roadway

Lawton Railway & Lighting Company, Lawton, Okla.—Extension of the car lines of Lawton, Okla., to Fort Sill and Medicine Park is proposed by the Lawton Railway & Lighting Company, according to announcement by B. S. Stephens, its president. The proposed extension will pass through the military reservation of Fort Sill and extend about nine miles beyond to Medicine Park, which is fast becoming "the playground of Oklahoma." Plans for financing the extension, which will cost about \$300,000, contemplate the sale of \$60,000 of 7 per cent bonds of the present company to the people of Lawton, and when this is done St. Louis capitalists have promised to carry the project through by advancing the \$240,000 remaining. Construction of the line will begin as soon as the financial details are completed.

Dallas (Tex.) Railway.—The question of forcing the Dallas Railway to comply with commitments made when the charter was granted in 1917, for the building of a double-track concrete viaduct across the Trinity River bottoms for the Oak Cliff lines, is being agitated by the Oak Cliff Commercial Association. The traction company soon after the franchise was granted constructed a portion of the viaduct, that portion over the tracks of the steam railways, thus eliminating a dangerous grade crossing, but building the rest of the viaduct was delayed on account of the cost of material. The traction company has done no further work toward the building of the viaduct, and the Oak Cliff citizens are growing restive and want immediate action.

Wichita Falls (Tex.) Traction Company.—The Wichita Falls Traction

Company expects to build a new car line which will extend from Indiana Street out Sixth or Seventh Street to connect the city with residential sections now without service.

Dallas-Wichita Falls (Texas) Interurban.—Early construction of the Dallas-Wichita Falls Interurban line has been abandoned, due to inability to finance the line at this time. This action is being taken now that the Dallas Railway has already begun construction on the Dallas-Terrell line under commitments made in the 1917 charter. The plan was to have the Dallas Railway build the line to Wichita Falls in lieu of the shorter lines for which it was committed. Under the preliminary financing details, a fund of \$1,000,000 was raised in Dallas and \$500,000 in Wichita Falls. The General Electric Company then agreed to donate an equal amount and \$4,500,000 first mortgage bonds was to be sold. Promoters of the line failed to dispose of the first mortgage bonds. Funds collected in Dallas and Wichita Falls are now being returned to the donors by Wiley Blair of Dallas, chairman of the interurban committee.

Power Houses, Shops and Buildings

Cleveland (Ohio) Railway.—The headquarters of the Cleveland Railway are now located in the new Hanna Building, Euclid Avenue and East Fourteenth Street.

Henryetta, Okla.—R. D. Long, former manager of the Muskogee (Okla.) Electric Traction Company, is attempting to finance a mammoth power plant proposal with a network of interurbans connecting Oklahoma City with Henryetta, Okmulgee and Muskogee. He is supposed to have the assurance of Eastern capital to insure completion of his plans. The proposed power plant is to be located at Henryetta, in the heart of the coal producing section of the state. The proposition is to supply most of the cities and towns of eastern Oklahoma with power from this plant.

Trade Notes

The Franklin Railway Supply Company, Inc., has moved its New York offices from 30 Church Street to 17 East Forty-second Street.

The Connecticut Blower Company, Inc., Hartford, Conn., contemplates the construction of a manufacturing and foundry building, for which plans have been prepared. The cost is estimated at \$62,500.

The Johnson Fan & Blower Company has been organized, with headquarters at 115 South Clinton Street, Chicago. A. J. Johnson, formerly assistant general manager of the Ilg Ventilating Company, Chicago, is at the head of the new concern. The company will manufacture ventilating fans and blowers.

The American Forge & Manufacturing Company, 2433-41 West 48th Street, Chicago, has announced its readiness to supply copper forgings of all sorts, those for motors and motor control apparatus being its specialty. Production was started Oct. 1, 1920, and according to the announcement has reached the point where all orders can be filled.

The Eureka Stone & Marble Company, 179 West Maple Street, Columbus, Ohio, has been incorporated in the State of Ohio at \$350,000 to take over the assets, good will, contracts and all other manner of business of the Eureka Marble & Tile Works Company, at the same address. Standard moisture-proof switchboard will have a special space and the company hopes to double its output in their manufacture.

The Black & Decker Manufacturing Company, Towson Heights, Baltimore, announces that its New York branch office, formerly at 141 Broadway, is now in the Printing Crafts Building, Eighth Avenue and Thirty-third Street, where a service station with stocks is also located. The Detroit branch office has been removed from 19 Selden Avenue to 27 Watson Street. The Atlanta branch office is now at 1508 Candler Building, where Thomas W. Peters, branch manager for the Southern territory, will make his headquarters.

New Advertising Literature

Engineering.—Warren D. Spengler, engineer, Hanna Building, Cleveland, is publishing a series of "Engineering Service Talks."

Foundry Sand Cutter.—The Whiting Corporation, Harvey, Ill., is distributing a four-page folder describing its motor-driven sand-cutting and screening machine for use in foundries.

Signals.—Magnetic Signal Company, Hellmann Building, Los Angeles, Cal., has issued an illustrated bulletin entitled "Safety With Economy," showing the principles and method of application of its magnetic "flagman."

Flexible Cords and Cables.—The Simplex Wire & Cable Company, 201 Devonshire Street, Boston, has developed solid-rubber-covered reinforced two-conductor and three-conductor portable cords and cable for heavy duty.

Track Grinding Machines.—Railway Trackwork Company, Clementine, Thompson and Mercer Streets, Philadelphia, has recently issued a loose-leaf bulletin on railway track equipment, giving detailed illustrated descriptions of reciprocating and rotary rail grinders.

Regulation.—"Progress in Regulation" a brief résumé of the present trend of opinion among the regulating bodies, is being circulated by Harris, Forbes & Company, New York. An account is given of the increases in rates awarded to public utility companies and extracts are published from decisions of commissions in several states.

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For heavy
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*(Such as New York's
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For heavy double truck cars weighing over 35,000 pounds you can depend absolutely upon the “Peacock Improved 12/52”—which means a gear ratio of 12 to 52. These Peacock Brakes are already part of the fast, heavy equipment of the Municipal Subway in New York City.

The design of the drum secures the most direct pull on the brake rod when the tension on the brake is greatest. Also, the chain can be readily adjusted to suit the amount of leverage on cars of different types and the Peacock AUTOMATIC STOP prevents the drum from unwinding beyond the point of full release. Leverages obtainable range from 50 lbs. on a 10-in. handle giving a tension of 1118 pounds to 75 pounds on a 14-in. handle developing 2,348 pounds.

Full details on request. Ask for Bulletin No. 5.

*In succeeding advertisements we will describe
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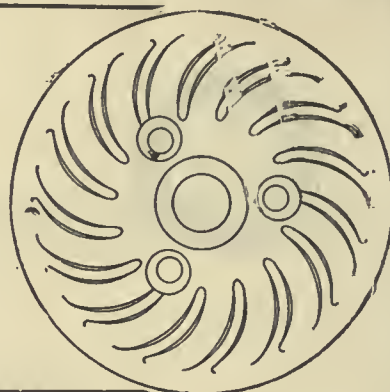
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FINANCIAL AID for Street Railways, in sight

We will assist you in financing your track maintenance. Get our "Special Payment Plan." Take advantage of it NOW.

The biggest investment any road can make at this time is TO SAVE WHAT YOU HAVE. You can do this at a very SLIGHT expenditure.

Spend HUNDREDS. SAVE THOUSANDS. Saving is making.

You will be doing one of two things:



This

"PATCH IT UP" Temporarily now, and AGAIN and AGAIN. Costing *EACH TIME* as much or more—by the "OLD WAY"—as by the Indianapolis Method.



Last Word in Reclamation of old and installation of new track.

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You are going to call the Indian-A-POLIS, and RESTORE as GOOD AS NEW, just as other managers in 46 States and Countries are doing—By the "INDIANAPOLIS METHODS."

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The MERIT of the "INDIANAPOLIS METHOD"...After 10 Years' TEST... Still the BEST Maintenance ELIMINATOR.

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More Roads using the "Indianapolis Method" than ALL OTHER methods COMBINED.
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If you are a USER, the more you use the more you SAVE.

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LEATHER CLOTH

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MERITAS Leather Cloth is right for seats and shades. Has plenty of body, a resilient surface that "hangs on," and a rich, leathery appearance. It thus enables the upholsterer to make a good looking job and one which will give good long service.

Meritas is strongly resistant to scraping by shoes and to stains. Water does not injure it—therefore it is easy to clean.

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OILLESS TROLLEY WH

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S TROLLEY WHEEL

The booklet "Trolley Wheels" contains a fund of vital facts on various types of More-Jones Trolley Wheels and Harps. Write today for a free copy.



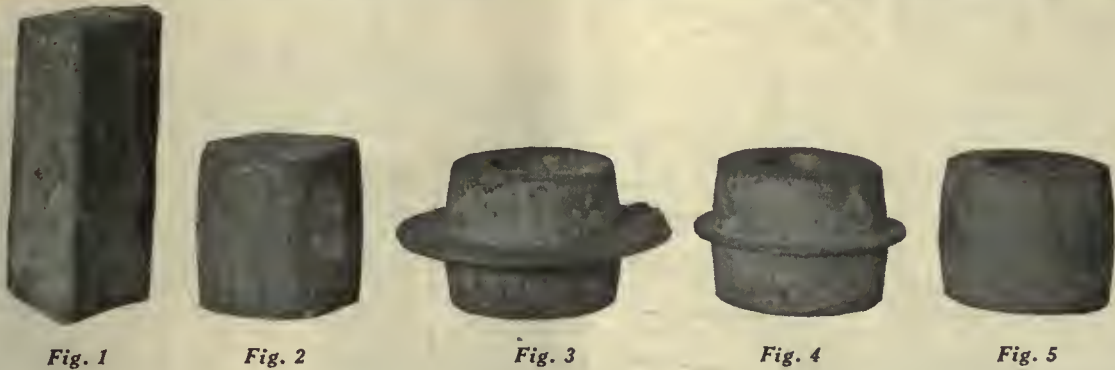
It reduces trolley maintenance costs

Cost of materials, time, and wear and tear on car roofs, incident to Trolley wheel replacements and dripping oil are almost ruinous in these days. V-K Oilless Trolley wheels, requiring no lubrication are eliminating contact problems and cutting costs in hundreds of installations. They can be installed and forgotten—will run until worn out without requiring any attention or expense for lubrication. The patented bronze gauze and graphite bushing provides necessary lubrication, without diminishing the wheel's current capacity. With the V-K Non-Arcing Harp, an ideal combination is obtained, where highest efficiency is demanded. V-K Wheels and Harps are the selection of good judgement. Send for "Trolley Wheels" illustrated, full of interest for every railway man.

More-Jones Brass & Metal Co.
St. Louis, Missouri

TROLLEY WHEELS:
V-K Oilless, M. J. Lubricated
HARPS: V-K Non-Arcing
BEARINGS: "Tiger"
Bronze
Axle and Armature
ARMATURE BABBITT
and Similar Products

MORE-JONES



Nuttall's New Process of Drop-Forging Motor Pinion Blanks

The illustrations above show the various steps in forging Nuttall special drop-forged motor pinion blanks.

Figure 1—Section cut from square rolled billet.

Figure 2—Billet upset and rounded.

Figure 3—Blank rough forged—first forming operation in retaining die.

Figure 4—Blank finish forged—second forming operation in retaining die.

Figure 5—Blank sized and trimmed—ready for machining.

Result—Improved Basic Material.

This process produces a basic material with close-grained interwoven fibres—free from the type of forging flow lines common in rolled bars.

This basic material, when subjected to the Nuttall BP heat treatment, has toughness and ductility to withstand shocks and strains, and hardness to resist wear—an ideal combination for railway motor service.

R.D. NUTTALL COMPANY
PITTSBURGH  **PENNSYLVANIA**

All Westinghouse Electric & Mfg. Co.
District Offices are Sales Representatives
in the United States for Nuttall Electric Railway
and Mine Haulage Products.

Nuttall



Mishaps Like This Belong to Yesterday
Modernize Your Current-Collection with

The Miller Trolley Shoe



The comedy—(which sometimes narrowly escapes being a tragedy) of the jumping trolley pole, doesn't fit in with efficient electric railway operation. The trolley wheel, with all its damages to overhead, schedules and your peace of mind—can't justify itself in contrast with the trouble-proof Miller Trolley Shoe.

Its three-inch area of *constant contact* provides an unshakeable grip on the line—no sparking, no jumping, even at mile-a-minute speed. Hence broken poles, smashed overhead, and damaged roofs are crossed off your books.

While you can reduce your tension you can get increased voltage. Traffic interruptions due to de-wirement are eliminated.

These are a few of the reasons why scores of electric railways are using the Miller Shoe. We want you to consider its advantages to your own line. Write us.

Miller Trolley Shoe Co.
West Newton, Mass.

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago
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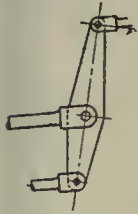
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San Francisco, Calif.

W. M. McClintock,
St. Paul, Minn.

S. I. Wallis,
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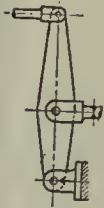
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Boyerized Pins, Bushing and Manganese Brake Heads Make Hardest Braking Safe

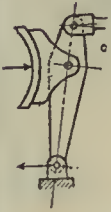


"No pushee, no pullee," said the Chinaman when the brake rigging failed to move.

And it will fail to move right or move at all because of such seemingly little accidents as worn holes or lost pins.



But you can assuredly minimize the worries and the excessive shop time that come from using horse-car brake-fitting standards for the quick-braking electric cars of today by equipping your brake-rigging with the longlived Boyerized pins and bushings.



While the force *transmitted* by that brake rigging is most effectively exerted through the equally famous Stag Brand Manganese Brake Shoe Heads—the heads that save the wheels.



3000 lb. or 10,000 lb. Boyerized brake rigging specialties will stand any force you have to apply.

BOYERIZE all the way from Cylinder to Brake Head

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Boyerized Wearing Plates between the Pedestal Straps and the Journal Box.

Boyerized Wearing Plates between the Bolster and Bolster Carrier.

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TEXACO CRATER COMPOUND
 to the gear case
 Photograph Taken
 in a large Eastern
 Electric Street Railway



Lubricate and protect gears and pinions with **TEXACO CRATER COMPOUND**

Texaco Crater Compound has the faculty of clinging to gear teeth despite speed and pressure so that constant effective lubrication is secured at all times.

This lubricant stands up well under temperature conditions and due to its length of life it insures economical lubrication.

It prevents wear thus increasing the life of the gears and pinions.

It has the same high quality that is daily increasing the demand for the rest of the Texaco Lubricants for electric street railways.

We shall be glad to make a complete survey of your line and make specific recommendations. No obligation is involved. We are glad of the opportunity to demonstrate our ability to assist you.



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 OFFICES IN PRINCIPAL CITIES





49 The map above shows the location of the 49 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels

Chicago	3	Boston	Huntingdon W Va
St. Louis	2	Detroit	Wilmington, Del
Buffalo	4	St. Paul	Houston, Tex
Pittsburg	2	Kansas City, Kan	Hannibal Mo
Cleveland	2	Denver	Reading, Pa
Amherst N.S.		Tacoma	Baltimore
Montreal		Rochester, N.Y.	Richmond, Va
Mich. City, Ind		Savre, Pa	Fl. William, Ont
Louisville		Berwick, Pa.	St. Thomas, -
Mt Vernon, Ill		Albany	Hamilton,
Fl. Wayne, Ind		Toronto	Rainapo, N.Y
Birmingham		New Glasgow N.S	Marshall, Tex
Atlanta		Madison, Ill.	Los Angeles
Savannah			Council Bluffs

AMERICAN RAILROAD ASSOCIATION STANDARDS

- 650 lb wheel for 60,000 Capacity Cars
- 700 lb. wheel for 80,000 Capacity Cars
- 750 lb. wheel for 100,000 Capacity Cars
- 850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for Seventy Years

Where
**CHILLED
 IRON WHEELS**
*are made for Railway
 and Street Car Service*

*Capacity 20,000 per day
 25,000,000 in Service*



Association of Manufacturers
 of Chilled Car Wheels

1847 Mc Cormick Bldg.
CHICAGO

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Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Gear Blanks

Steel Forgings

Iron Forgings

Forged and Rolled Steel

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Ring Dies

Rings

Roll Shells

Steel Springs



*“The ‘Standard’ Brand on your material
is an assurance of eventual economy.”*



STANDARD STEEL WORKS CO.

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SAN FRANCISCO
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HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

Raagni

The Raagni of Deepak is a melody which is often pictorially represented by the Hindus as a dainty maiden subduing the mighty beast by the power of her song.

Some writer at some time in the past has already made the observation that "music hath charms to sooth the savage breast," or words to that effect, but when it comes to being in the immediate presence of anything so exuberantly savage we'd much prefer to place reliance in our legs than in the power of a song.

Just as in the presence of a decision about to be made we prefer to rely on common sense and logic rather than the hokus-pokus of tradition.

Years ago an operator would order carbon brushes indiscriminately, as to type, and feel satisfied that he was doing the best that could be done. So he was. But the world moves.

Nowdays a wise operator chooses his brushes the Morganite way. Peculiarities in operating conditions are taken into account by a Morganite engineer who specifies the proper type of brush for each machine. Brush trouble is *avoided*.

Sensible? *Sure it is!*



Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

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R. W. Lillie Corporation,
176 Federal Street, Boston, Mass.

W. R. Hendey Co., Hoge Bldg., Seattle



Herzog Electric & Engineering Co., 150 Steuart
St., San Francisco

Charles Farnham, I. W. Hellman Bldg.,
Los Angeles

Railway & Power Engineering Corporation, Ltd.,
131 Eastern Ave., Toronto, Ontario, Canada

T. S. Q.
says

"I save repair costs."

THE U-RE-LITE



A modern Circuit Breaker to meet modern conditions. An I-T-E Circuit Breaker in a steel box: so much better than a fused switch that it is in a class by itself.

It opens instantly on the occurrence of a short circuit or a predetermined overload and can be as instantly reset, but it cannot be closed if the overload continues on the line.

IT DOES AWAY WITH THE CONSTANT EXPENSE AND THE DAMNABLE ANNOYANCE DUE TO THE USE OF FUSES, FOR THE CRY "FUSE BLOWN" MEANS IDLE MEN. It greatly diminishes the possibility of fire from electrical causes and affords positive protection to employees as well as to light or power circuits.

Made in capacities of 60 amperes and under for D.C. circuits of 250 volts or less and A.C. circuits of 250 volts or less, single phase.

Each pole is closed by a slight turn of the handle, which is seen projecting above and below the tripping knob, by means of which the U-RE-LITE may be opened manually.

*First to the left,
Then to the right,
Turn the handle
And U-RE-LITE.*

LITERATURE UPON REQUEST

The Cutter Company
PHILADELPHIA



Bates One-Piece Steel Poles with Ornamental Lighting

This installation illustrates one of the possibilities of combining Artistic Bates Poles with ornamental lighting units. The excessive number of poles required where trolley conductors and lighting units are installed on separate poles is not only decidedly inartistic, but is also a needless waste of good material. Of course, it is necessary that an

artistic steel pole be used for such a combination of purposes.

The series lighting conductor is run from pole top to pole top eliminating the use of expensive, troublesome underground cable.

The use of Bates Permanent Steel Poles with ornamental lights represents maximum economy and the utmost in art.

B E S T
Bates Expanded Steel Truss Co.

208 South La Salle Street
CHICAGO, ILLINOIS

Nachod Signals Get Results

A 200-mile Electric Railway in Pennsylvania has been using Nachod Signals for the past 10 years, gradually increasing its signaling equipment until all its single track is now protected, there being over 130 Nachod Signals in operation. The signal maintenance is of a high type, and the cost per signal is extremely low. The railway has found these signals of immense benefit in increasing traffic by preventing needless delays, checking the dispatcher's work, and contributing in many ways to safe operation. Of one block on a single track bridge it was said: "If those signals were removed there would be a strike." The railway has come to depend upon the signals to such an extent that were they suddenly removed, service would be prostrated—and yet the company *did* operate without them.

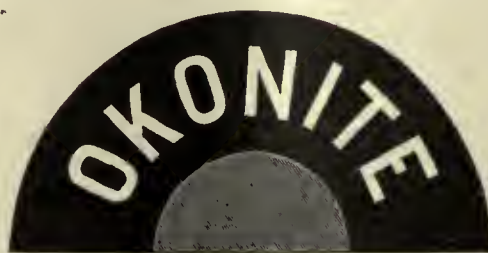
*How many such roads are there thruout the country operating without Nachod Signals that might receive equal benefits if they would?
Is yours one of them?*

NACHOD SIGNAL CO., Inc.
Louisville, Ky.

Nachod Signals are described in Catalog 719. Nachod Highway Crossing Bells will safeguard your crossings and prevent damage suits. Read about them in Catalog 720. Nachod Headway Recorders show how your cars run, so that you can keep them on time. Ask for the Manual.

Signal and Bracket





TRADE MARK
REG. U. S. PATENT OFFICE.

VARNISHED CAMBRIC Wires and Cables

are made with the same care and high regard for quality which distinguishes the production of OKONITE rubber insulation.

*We are prepared to handle any high grade proposition,
and solicit your inquiries.*

"Manson" Tape (Friction)

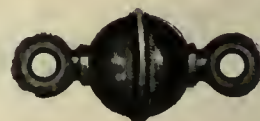
"Okonite" Tape (Splicing Compound)

THE OKONITE COMPANY, Passaic, New Jersey

Incorporated 1884

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Philadelphia, Pa. Pettingell-Andrews Co., Boston, Mass.



You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

The Macallen Line

of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.



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The Macallen Company
Macallen and Foundry Sts., Boston



The Cross Over is a weak link



Reinforce your
overhead with

ANDERSON CROSS OVERS



When a Cross Over goes wrong traffic is affected on more than one line. Don't trust such responsibility to an unknown make of Cross Over, but insist upon a service tested product. Anderson Cross Overs have proved their reliability for 20 years.

Long wear and remarkable strength—both wire and crossing.

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Hydraulic Portable Rail Bender

The portable rail bender shown herewith is designed for use on the road. It is equipped with interchangeable formed bending blocks, and will make any bend without buckling. The hinged yoke permits the rails to be put in sidewise. It can also be used for other heavy bending.

We build many other handy tools for the railway shop. Such as: Crank Pin Presses, Wheel Presses, Forcing Presses, Forging Presses, Jacks, Pit Jacks, Punches, Shears, Pumps, Accumulators, etc.

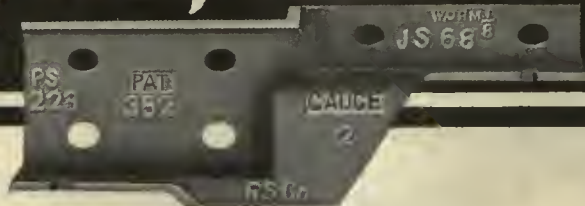
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The Watson-Stillman Co., 46 Church St., New York

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Reading Compromise or Step Joint



Built for Permanency

Reading compromise or step joints are made from your own specifications and are guaranteed. Only the highest quality of heat treated cast steel goes into a Reading joint. By this casting process, the metal is concentrated at the point of greatest distribution of metal insuring a joint of greatest strength.

Insist upon them for your new and rebuilt track

AMERICAN CHAIN COMPANY, Incorporated



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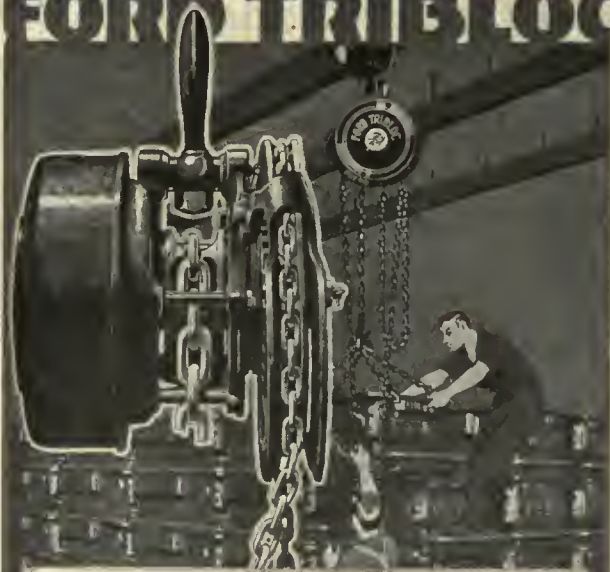
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Their burden is carried by a FORD TRIBLOC.

These men do not work with the blind force of a gang of ignorant hunkies. They're strong men, but their strength is directed — their efforts are centered in placing the loads.

Men are fond of the TRIBLOC. They work under it, over it, relying on it with perfect confidence. They know it will not fail. They work it from any angle, at high speed, for they find that the hand chain will not "gag" or override the hand wheel flange. Familiarity has bred respect.

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The Test of Time

International Registers would not have reached their present position in the electric railway field if they had not been designed and built correctly.

Their adoption as standard on a majority of street railways throughout the country is based upon their proven value through many years of service.

International Registers are made in types and sizes to meet the needs of street railway collection methods, and provide dependable, accurate registration under all conditions. We will be pleased to advise equipment and methods to solve any problems you may have.

The International Register Co.

15 South Throop Street, Chicago

**"ACME" (NESTABLE)
CORRUGATED METAL CULVERTS**



Not affected by 13 years' service

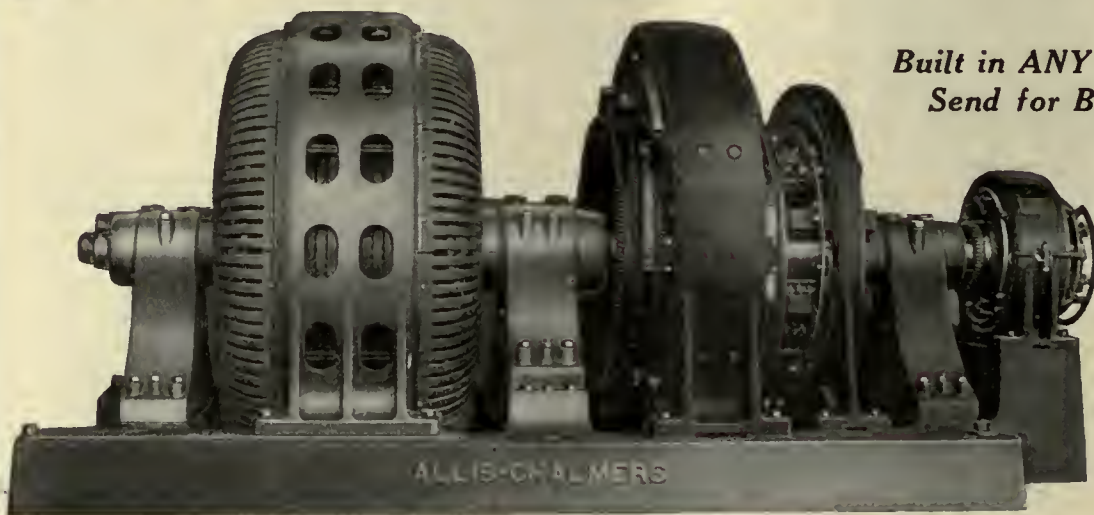
This 36-inch "ACME" installed under The Toledo & Indiana Ry. has just completed its thirteenth year of service. A good record. Yet, the big point is not that it has given thirteen years' service—but rather that it is still in perfect condition after being in use that long.

Aside from a weatherbeaten appearance, this "ACME" is in just as good condition as when installed. Its surface is unimpaired, indicating that it will be good for many more years. "ACMES" resist the tendency to rust because they are made of Toncan Metal—it endures! Write for delivered prices.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
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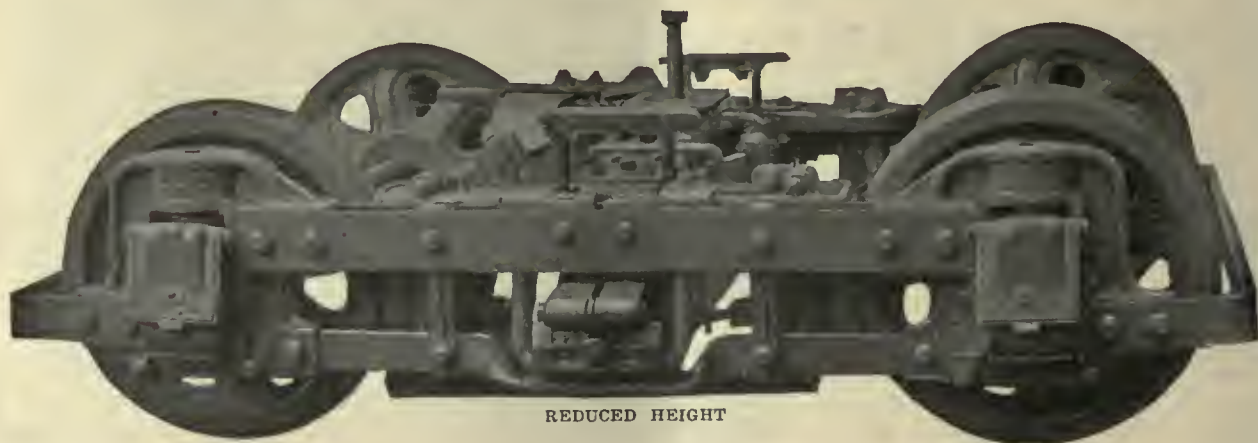


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Send for Bulletin.*

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Mounted on 26-in. Wheels with Springs Over Journal Boxes.
Designed to Mount Centre and End Entrance Cars Low Down.

SWING MOTION AND FULL ELLIPTIC SPRINGS

Wheel Base 5 ft. 2 in. For Car
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**EASY
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Journals $3\frac{3}{4}$ x 7 M. C. B. Type.
Height from Rail to Body Bolster,
22 $\frac{3}{4}$ in. Brakes Inside Hung.

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SPECIFICATIONS ON REQUEST

Established 1892

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Save or Pay

Now is the time to save—or pay. Safety Car Prices are lower—Operating Costs for safeties are less—Savings are higher—Make every penny count—the sooner you buy the sooner you save—with Quality Safeties Others are saving—so can you—may we prove it?

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"The Birthplace of the Safety Car"

We sell them in Missouri or in any other place where the buyer must be shown that—Hensley Guaranteed Trolley Wheels give better service at less cost.

Write for details and revised prices

Hensley Trolley & Mfg. Co.
Detroit, Mich.



LaFrance Safety Devices for Every Industry

Workmen Enjoy Wearing LaFrance Adjustable Goggles No. 1462

Despite their rigidity LaFrance Goggles fit comfortably for they are adjustable and do no subject the wearers to the inconvenience and discomfort which is so common to the wearing of ordinary goggles.



No. 1462

These goggles are easily adjusted to fit comfortably without undue pressure on the nose, cheeks or temples. The bridge is adjustable so that the distance between the lenses can be increased or decreased as needed. LaFrance Goggles rest comfortably at any angle for they are equipped with a tilting nose pad. These goggles can be obtained equipped with superdreadnought optical glass or LaFrance Laminated non-shatterable lenses.

The LaFrance line includes many other patterns of goggles in addition to hundreds of other safety devices, such as Marks, Safety Signs, Respirators, First Aid Equipment, Rubber Gloves, Asbestos Gloves, Fireproof Electric Lanterns, Steel Grip Gloves, Fire Apparatus, etc.

Write for our complete catalogue. It illustrates and describes them all and gives valuable first aid charts.

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When you put your money into KERITE you make an investment in service. You do more than buy conductors, insulation and protection. You obtain the best possible combination of the most desirable qualities in permanent form. KERITE remains long after the price is forgotten.

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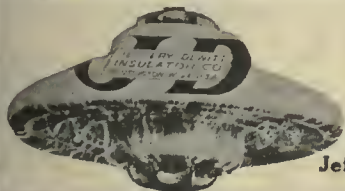
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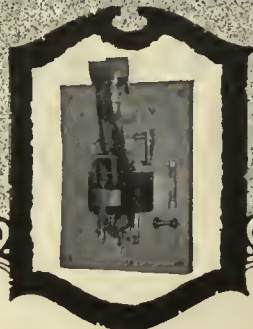
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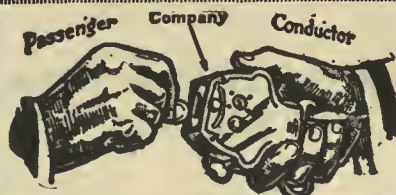
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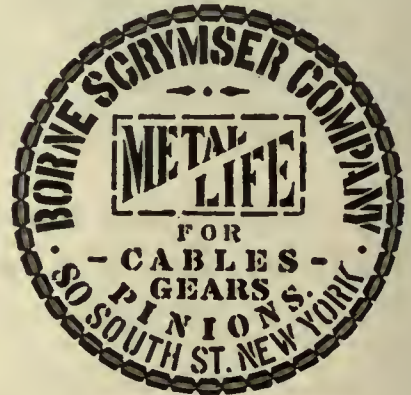
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MOTOR CARS

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1 Single Truck Motor Car

Fine condition. Complete, ready to use. A Bargain.

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At A Sacrifice

14 Westinghouse Railway
68 and 68 C

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Harbour-Stockwell Co.
Bemis Car Truck Co.
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Columbia M. W. & M. I. Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Traction Brake Co.

Brass & Bronze Products
American Copper Products Corp.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
National Carbon Co., Inc.
Westinghouse Elec. & M. Co.

Brushes, Graphite
National Carbon Co., Inc.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brs Bars
American Copper Products Corp.

Bushings, Case Hardened & Manganese
Bemis Car Truck Co.
Brill Co., J. G.

Bushings, Graphite & Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Cambrie, Tapes, Yellow and Black Varnished
Irrington Varnish & Insulator Co.

Cambrie, Yellow and Black Varnished
Irrington Varnish & Insulator Co.

Carbon Brushes. (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.

American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Railway Appliance Co.
St. Louis Car Co.
Thomas, Perley A.
Wason Mfg. Co.

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Electric Equipment Co.

Car, Self-Propelled
General Electric Co.

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Columbia M. W. & M. I. Co.
More-Jones Brass & Metal Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.

Columbia M. W. & M. I. Co.
St. Louis Car Co.
Standard Steel Works Co.
Wharton, Jr. & Co., Inc., Wm.

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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

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Earl, C. I.
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Ohio Brass Co.
Wood Co., Chas. N.

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Pantazote Co.

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Automatic Reclosing Circuit Breaker Co.
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Brill Co., The J. G.
Ohio Brass Co.

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General Electric Co.

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Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
Electric Service Supplies Co.

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Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kieking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

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Electric Service Supplies Co.
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Johnson Fare Box Co.

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Electric Service Supplies Co.
General Electric Co.
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General Electric Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. B. Co.

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Ingersoll-Rand Co.

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Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

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Standard Underground Cable Co.

Connectors, Solderless
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

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General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
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Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Copper Wire
Copper Clad Steel Co.

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Electric Service Supplies Co.
International Register Co., The
Roebeling Sons Co., John A.
Samson Cordage Works
Silver Lake Co.

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Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

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Brill Co., The J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

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Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., Th.

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International Steel Tie Co.

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Crossings, Manganese
Indianapolis Switch & Frog Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Track. (See Track, Special Work)

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Brill Co., The J. G.
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Pantazote Co.
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Zeluckner Supply Co., Inc.,
Walter A.

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Cleveland Frog & Crossing Co.

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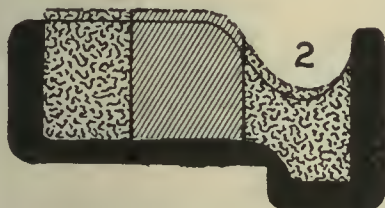


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Sanderson & Porter
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General Electric Co.
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Creaghead Engineering Co.
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Electric Service Supplies Co.
General Electric Co.
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Ohio Brass Co.
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General Electric Co.
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More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Westinghouse Elec. & Mfg. Co.

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Economy Electric Devices Co.

Meters. (See Instruments)
Electric Service Supplies Co.

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Macallen Co., The

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Ohio Brass Co.
Westinghouse Traction Brake Co.

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Watson-Stillman Co.
Westinghouse Traction Brake Co.

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Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.

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Electric Railway Equipment Co.
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Economy Electric Devices Co.
National Railway Appliance Co.

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Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Ohmer Fare Register Co.
Rooke Automatic Register Co.

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American Steel & Wire Co.
Lackawanna Steel Co.

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Electric Service Supplies Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

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Electric Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G.

Scrapers, Track. (See Cleaners and Scrapers, Track)

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St. Louis Car Co.
Standard Textile Products Corp.

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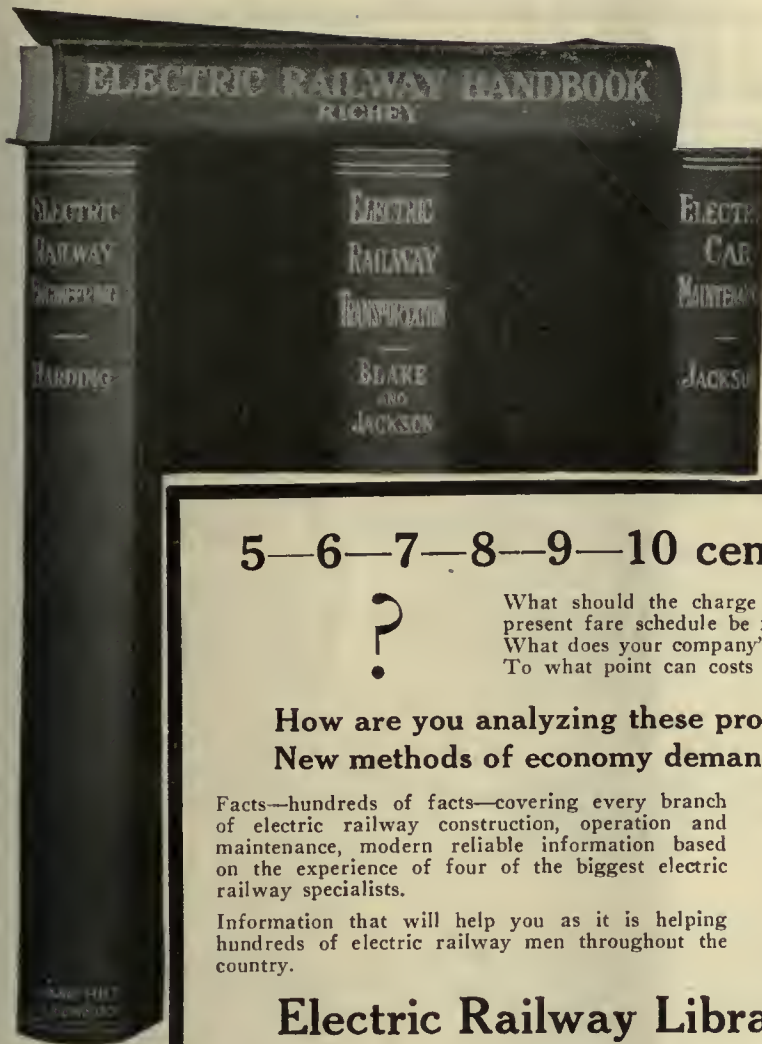
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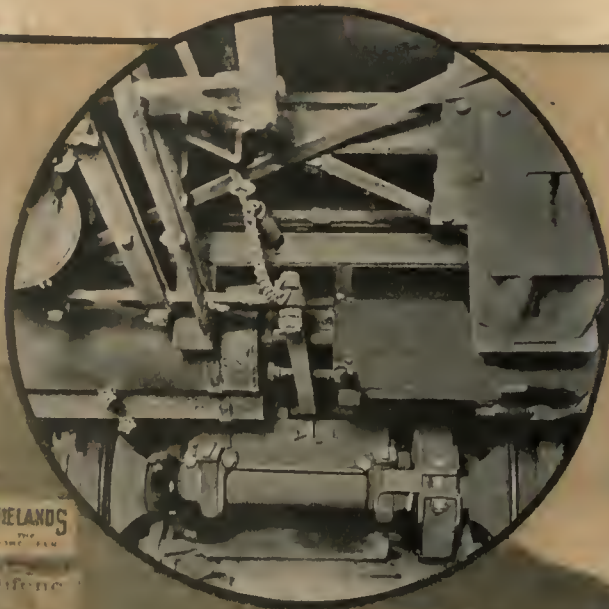
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Electric Railway Operating Economy



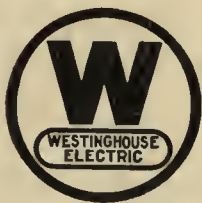
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Electric Railway Journal

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Engineer vs. Auditor in Cost Keeping

A conference of these department heads with the general manager brings to light the common controversy and points out the moral in an interesting colloquy. E. A. W. gives an account of the conference.....Page 893

Selling Rides in a City with a Population of 6,000

Interesting experiment during nine months of 1920 in selling twenty-five tickets for \$1 at Nelson, British Columbia, pushed by woman chairman of street railway committee of the Board of Aldermen. The straight 5-cent cash fare is bringing less today.....Page 895

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SEND FOR PUBLICATION 9045

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Same sturdy construction as the O-B Retriever.

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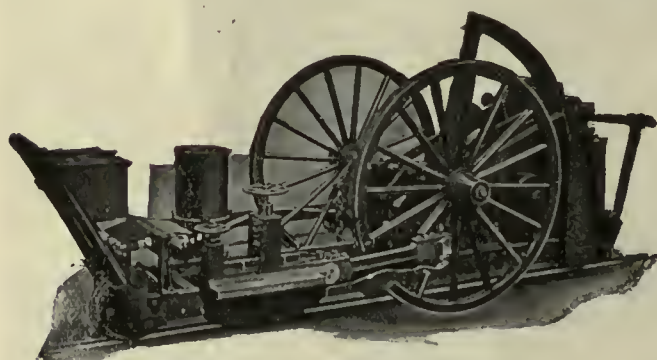
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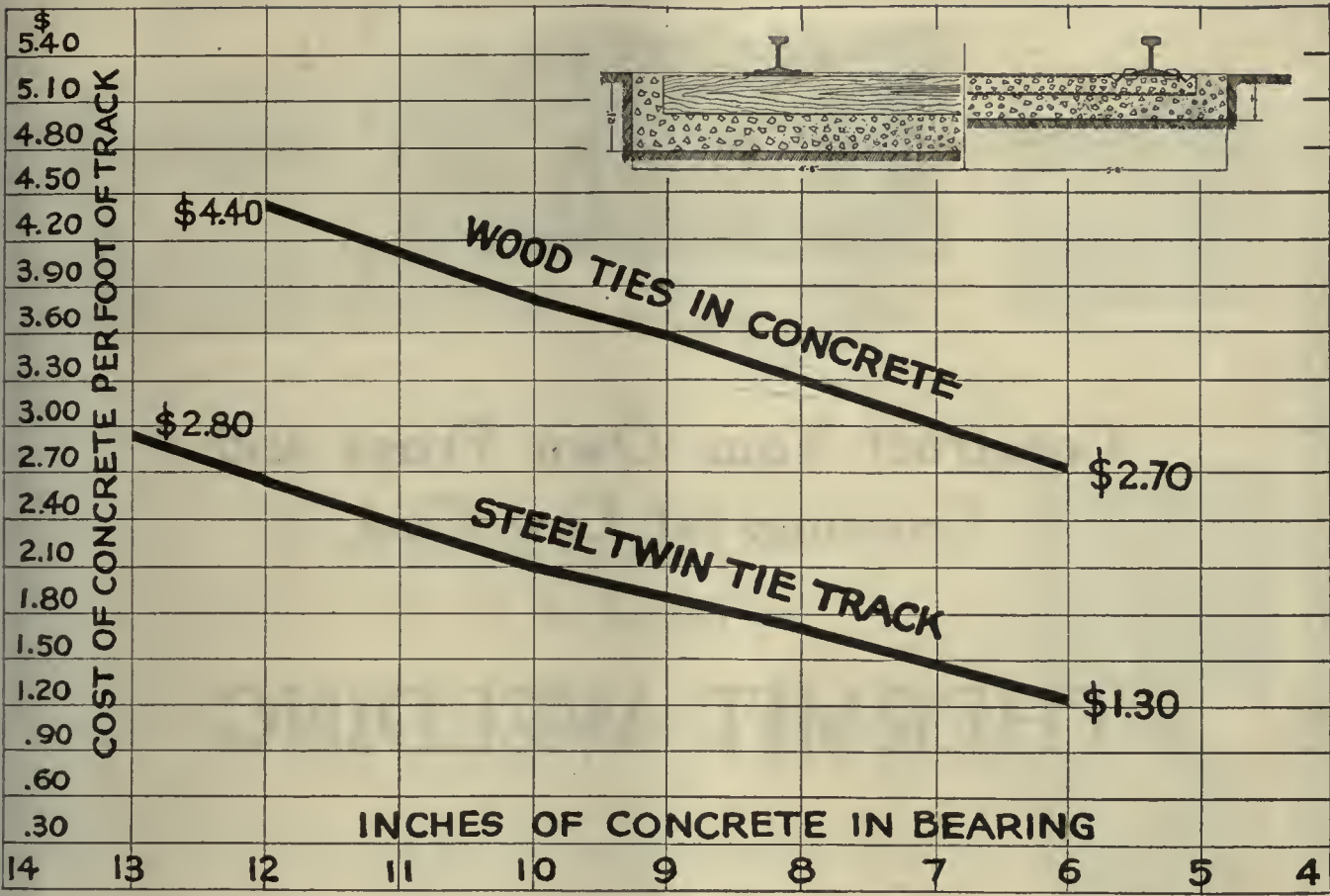
Doing nothing toward saving track from wearing out requires no expenditure from maintenance account. But is it economy? The spigot is tight, not a drop can escape—but how about the big leak?

Doing nothing toward maintaining track in good condition permits insignificant rail and joint wear to develop deep corrugations, cupped joints and broken rail ends.

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Non-essential Concrete Costs More Than Steel Ties

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utilization of the concrete in the track foundation than is possible with wood tie designs.

The comparative initial economy of Steel Twin Tie construction depends on the type of construction with which it is compared.

In order to determine the possible saving on your property, include a comparative estimate with Steel Twin Ties on the work your track department has up for 1921.

Price on Twin Ties at your delivery point will go forward by mail or wire at your request.

THE INTERNATIONAL STEEL TIE COMPANY, Cleveland, Ohio
International Steel Twin Ties manufactured and sold in Canada, by Sarnia Bridge Co., Ltd., Sarnia, Ont.

Steel Twin Tie Track



Constructing a single-track crossing by Thermit Welding,
on an Oklahoma system

Construct Your Own Frogs and Crossings at Low Cost

by means of

THERMIT WELDING

By using Thermit welded special track work your own men build your frogs and crossings as you need them, or as opportunity presents, many times using rail lengths which would otherwise be scrapped.

Experience has proved that Thermit welded special track work will outlast all other types of special work, except the solid cast manganese. When it is considered, however, that Thermit welded frogs can be constructed at only a fraction of the cost of solid manganese frogs, the advantages of the latter entirely disappear.

Let us start you off immediately by sending you a Thermit outfit and also an experienced track engineer to instruct your men in welding frogs.

Send for our latest Railwelding Pamphlet 3932.

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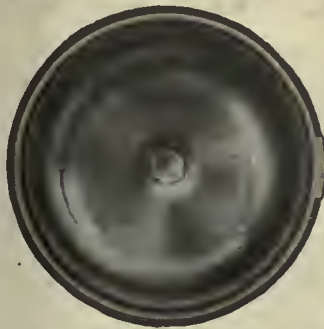
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No. 22181 Resistance Panel



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No. 19403 Buzzer

FARADAY

HIGH VOLTAGE CAR SIGNALS

The Faraday signal system provides a dependable and economical means of operating car push-button signal systems direct from the trolley circuit of 500 to 600 volts, thus doing away with the necessity of using a dry cell battery and consequent cost and annoyance of replacing run-down batteries.

When this system is once installed the cost of maintenance is practically negligible and, unlike the battery system, the buzzers do not have to be frequently adjusted to compensate for the running down of the cells.



No. 19587 Vibrating Bell



Type A
Push Button



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ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

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H-B LIFE GUARDS COVER THE GLOBE

In far away New South Wales, the advantages of H-B Life Guards are well known.



Protect
Your
Public
and
Secure
Their
Goodwill
by
Providing
the Safest
Service
Possible

Saving Human Life

The need for saving human life extends all over the world. In any industry, any method, equipment or practice that will reduce the yearly toll of lives from accidents is justifiable.

Wherever street cars are in operation, H-B Life Guards are preventing front end accidents and saving thousands of lives every year. Aside from the large reduction in claims wherever H-B Life Guards are used, the installation of this safety device represents the best form of safety insurance because the protection is always there, whether it is used or not.

Thanks to the almost universal use of H-B Life Guards, the electric railway hazard is decreasing year by year.

The action of H-B Life Guards is positive and quick as a flash. They require but little attention and work automatically.

Specify them and watch your claims decrease.

The Consolidated Car Fender Co.
Providence, R. I.

General Sales Agent

Wendell & MacDuffie Co.
61 Broadway, N. Y.

Modernize!*Pneumatize!*

Because a Conductor has only two hands

he cannot be expected to close the doors and steps with one pair of hands, while collecting fares, issuing transfers, giving starting signals and guiding the passenger flow at the same time.

Cars whose conductors are expected to do all these things cannot make a profitable revenue mileage during the rush hours— or, for that matter, in any worthwhile traffic hours.



Equip but a part of your cars with National Pneumatic appliances and you will no longer have your conductors do by hand anything that can be done better, faster and more safely by

National Pneumatic

Door and Step Control

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Interlocking Safety Door Control

and Multiple Unit Door Control

Manufactured in Canada by
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National Pneumatic Company, Inc.

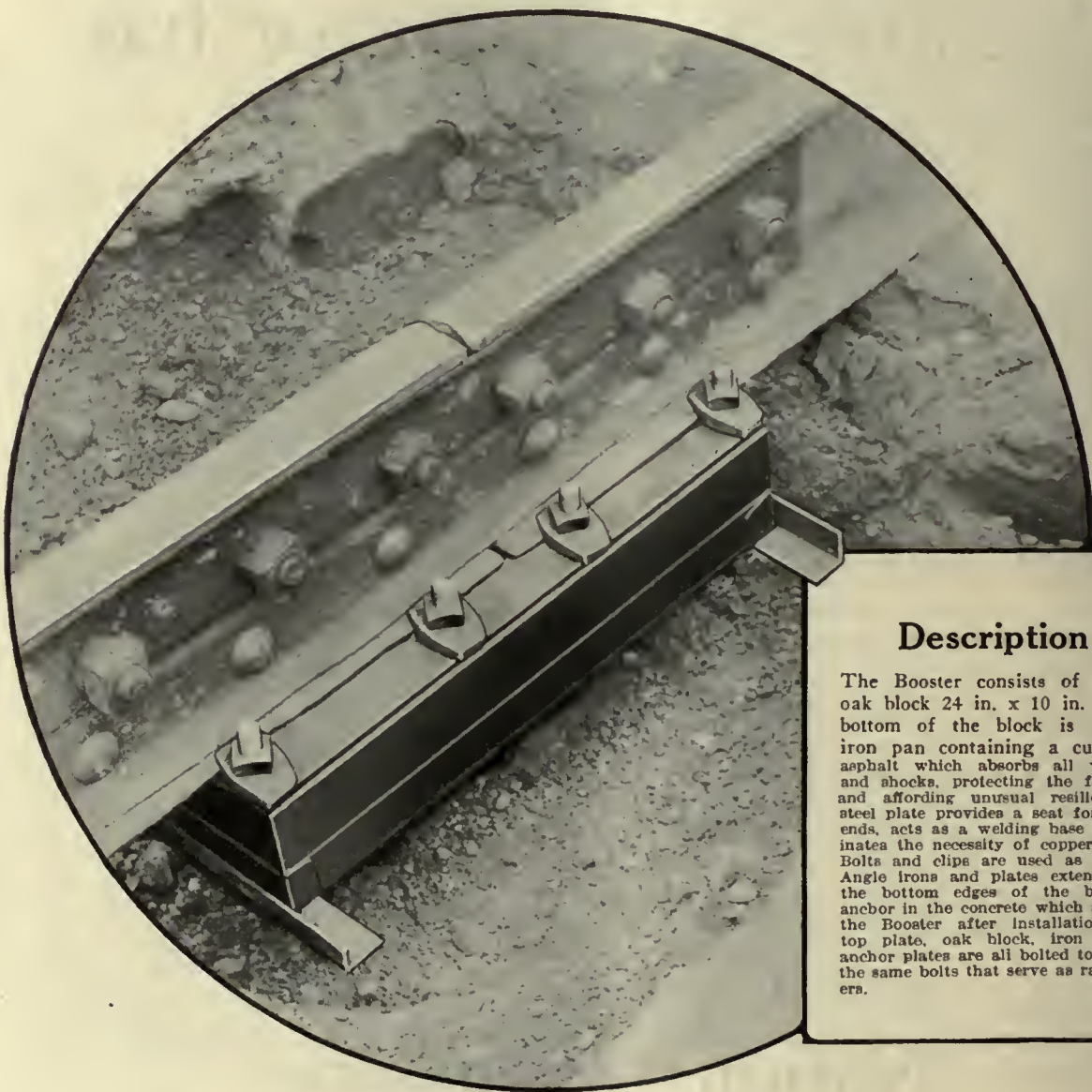
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■ Add 7 More Years of Life

all further track and paving repairs



Description :

The Booster consists of a white oak block 24 in. x 10 in. On the bottom of the block is a heavy iron pan containing a cushion of asphalt which absorbs all vibrations and shocks, protecting the foundation and affording unusual resiliency. A steel plate provides a seat for the rail ends, acts as a welding base and eliminates the necessity of copper bonding. Bolts and clips are used as fasteners. Angle irons and plates extend beyond the bottom edges of the block and anchor in the concrete which surrounds the Booster after installation. Steel top plate, oak block, iron pan and anchor plates are all bolted together by the same bolts that serve as rail fasteners.

DAYTON

to Your Track and eliminate for \$4.50 per joint

ARE your rail joints low—their foundation rapidly crumbling away—the paving all caved in—your rolling stock being rapidly knocked to pieces by giant hammer blows?

Are you tearing up the pavement about every six months—using shim after shim giving only temporary repairs?

Are you just about satisfied that you'll soon have to lay some new track?

Then why not

"Add 7 more years of life to your track and eliminate all further track and paving repairs for \$4.50 per joint."

Permanent—Economical Easy to Install

By far the biggest part of the cost in repairing a rail joint is the tearing away or opening up and relaying of the pavement, labor alone costing practically 90% of the whole.

Why repeat such an expensive operation every six or eight months? Why not do it right the first time, make the repair last 7 to 10 years, and save all that heavy labor expense?



Dayton Resilient Joint Boosters are permanent, economical and easy to install. No more labor, time or space is required than on the ordinary makeshift repair and they last fifteen times longer.

Satisfy Yourself

Railways all over the country are giving their old track a new lease on life by using the Booster. Let us tell you about a few of them and show you facts and figures proving their great saving.

Just pin the attached coupon to your letterhead and get full details.

The Dayton Mechanical Tie Co.

705 Commercial Building
Dayton, Ohio

Resilient **JOINT BOOSTER**

Pin to Letterhead

The Dayton Mechanical Tie Company
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Dayton, Ohio

Gentlemen:

Please send me full details and information about Dayton Resilient Joint Boosters.



In the Emergency—

When minutes count and any delay means disrupted service, a CONDIT Type F-6 Oil Circuit Breaker proves its worth.

Dependable to the utmost. Replacement—a matter of minutes.

Restoration of service with a CONDIT F-6 removable unit is as simple as saddling a fresh horse or putting on a spare tire—just slide it into the cell and resume service.

Write for Bulletin 435.



Specifications: 25,000 Volts, 500 Amperes; 15,000 Volts, 800 Amperes; Manually or Electrically Operated; Removable Unit; Interrupting Capacity, 10,000 Amperes at 15,000 Volts.

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South Boston 27, Mass.

Manufacturers of Electrical Protective Devices

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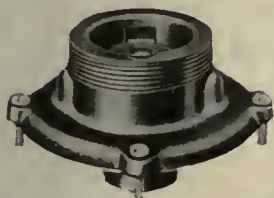
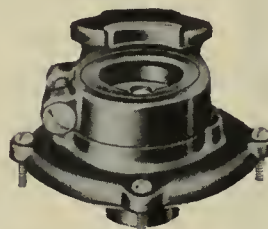
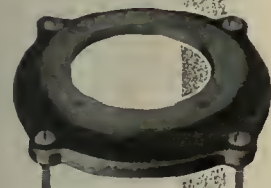
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Watertight Hub Cover

GSC Condulet body

Blank Cover
WatertightPlug Receptacle Housing
threaded without
brass capPlug Receptacle Housing
with spring door
non-watertightLamp Receptacle Cover
watertight

A Universal Convenient Condulet

THE GS Series of Condulet bodies can be applied to a wide range of conduit wiring because of the numerous covers and attachments made for them.

Covers and attachments include blank covers, hub covers, plug receptacle housings, switch covers, lamp receptacle covers, and fuse block. All watertight covers and housings are supplied with a rubber gasket and the cover fastening screws are located outside of the gasket. This construction in connection with the tapered, tapped hubs, makes the Condulet absolutely watertight.

Bulletin 1000-M describes these Condulets. Ask also for complete Catalog of Condulets.

Switch Cover
WatertightPlug Receptacle Housing,
with brass cap,
watertight

Fuse Block

Plug Receptacle Housing
without spring door

CROUSE-HINDS COMPANY

SYRACUSE, N. Y.

BOSTON NEW YORK CHICAGO

Condulets Panelboards
Knife Switches Floodlights
Guy Anchors
1619

*Condulet
the Job*

CROUSE-HINDS



Make It Easy for This Man to Ride

Here is a man who has to go down the street three or four blocks to keep an appointment. When fares were a nickel this man invariably waited for a street car. But now, when fares are higher and he has to handle odd coins, he sometimes walks. Somehow those odd pennies bother him—they seem like quite a bit of extra money to pay for a three or four block ride.

And yet it's these short rides that help pay dividends. It's the short ride customer who so often bridges the gap between profit and loss.

Bring him back!

If higher fares on your property have driven away the short ride customer—bring him back.

On more than 200 electric railways, Johnson Fare Boxes and Johnson Metal Tickets are accomplishing this very thing—and it's easy to understand why. A man with a pocketful of Metal Tickets *forgets* about the odd fare and the higher rate. To him a ride means only one less ticket—and he rides, whether the distance be 3 miles or 3 blocks.

Our Engineering Department has a lot of interesting figures on the money saving characteristic of Johnson Fare Boxes. Would you like to see them? If so just drop us a line and we'll gladly give you all the facts. No obligation—write today.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.



Telling something you already know

The great majority of the electric railways of the United States are using Galena Oils and Galena Service for car and power house lubrication.

These railways specify Galena products for one reason only—because they have proven their superiority in the tests of actual service.

This company *specializes* in the business of railway lubrication. It is not a *side line*. Galena Oils are built especially for railway work, each grade for a specific purpose. They are the result of years of painstaking test and study, given by practical mechanical men who know the requirements of the service.

Quality is the foundation stone of Galena business—quality in oils and quality in service. Galena Oils are the recognized quality standard for railway lubrication, everywhere. As representatives of the oldest and largest lubrication organization in the world, Galena Service is in constant touch with the latest developments in railway work, and is further perfecting efficiency in the scientific lubrication methods that have already proved a most valuable aid to the railways in producing improved operation.

Therefore, the ever-increasing demand for Galena lubricants is but an honest tribute to merit daily exemplified by incomparable performance on the railways of the East, West, North and South.

*When Galena Service Goes In
Lubrication Troubles Go Out!*

THE GALENA-SIGNAL OIL CO.

NEW YORK FRANKLIN, PA. CHICAGO

Offices in all principal American Cities

LONDON BUENOS AIRES PARIS

GALENA
SERVICE

GALENA
SERVICE

Least overhead trouble is suffered by those railways which standardize throughout on line material of a type that has proven its worth



Standard Round Top Hanger



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Form C Clinch Ear



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Form "N" Frog With Renewable Wearing Pan



Form K2 Adjustable Crossing

G-E Means "Good Everywhere" In Railway Line Material

Uniform high quality marks the complete group of line material the General Electric Company has been making for years. Constructed of best quality metals and carefully manufactured, these devices, which count so heavily in the maintenance of railway trolley lines, have satisfactorily served many systems.

This line material is sold not on promises but on performance. Bulletin 44004 B shows the complete line and gives further particulars. Send for a copy.

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all large cities

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 57

New York, Saturday, May 14, 1921

Number 20

Send Large Delegations to Atlantic City in October

IN VIEW of all the circumstances, the selection of Atlantic City as the place for the fall convention appears to be a wise one. Undoubtedly there are many railway men in the East who would have been pleased if the choice had fallen upon a city in the Mid-West, like Chicago, Indianapolis or Cleveland. Much has been published about railway practice in these cities, and if one of them had been chosen, an easy opportunity would have been afforded for Eastern railway men to see directly some of the construction and practice about which they have heard and read. Nevertheless, Atlantic City possesses the great advantage that the hotels are fairly near together and there are not the distractions from attendance at the meetings incident to a convention in a large city and due largely to the opportunities for excursions to points of interest. After all, the formal discussions in the meeting halls and informal ones outside are the main purposes of the convention. If these purposes are best secured at a meeting place like Atlantic City, then the choice of that place is justified.

The exhibits will necessarily be missed, especially at Atlantic City, but the decision to omit them applies only to this year. If conditions are more favorable next year, the exhibits will be appreciated all the more because of this year's omission. But each member company, including the manufacturing companies, should send as many delegates as it can afford to Atlantic City in October of this year, for the program of subjects is bound to be an attractive one, and the convention will be well worth the trip, in spite of the absence of exhibits.

Tendency to Settle Wages Without Strikes Is Gratifying

THERE has been a growing and gratifying tendency in electric railway labor matters for companies and men to settle their wage questions directly and without the intermediation of arbitrators. A number of cases of this kind have already been mentioned in previous issues of this paper. Another and conspicuous instance occurred last week when the employees of the Detroit United Railways agreed by a vote of four to one to accept the company's offer in its entirety. In this case three propositions were submitted for consideration, namely, acceptance, arbitration and strike, and the first was adopted by a vote as compared with the second of seventeen to one and as compared with the third of five to one.

Of course a decision of this kind cannot be reached unless the question is approached by both sides in a spirit of reasonableness and desire for settlement. Even when this is done, resort must often be had to arbitration, and it is no reflection on the attitude taken by either side when the opinions of impartial arbitra-

tors are asked. But a direct settlement, where possible, is quicker and more preferable.

It has also been noticeable and gratifying that the number of electric railway strikes over wage reductions during the past six months have been very few. In fact, except for Akron, where the men stopped work on May 5, but later went back, pending arbitration, Albany has been the only conspicuous case of a strike, and the company there was the first of the larger companies to make a wage reduction. There were many dire predictions of industrial trouble to follow a decrease in wages when the lowering cost of living foreshadowed such a reduction, but fortunately these predictions proved false. Undoubtedly both sides have been anxious to avoid strikes, one reason being that the men know the extent of present unemployment, while the companies realize that during the past few years, with their high wages and saving habits, developed through Liberty Loan campaigns, the men have presumably more reserve capital to live on during a strike period than formerly.

Another and still more important reason for the small number of strikes has been that a reasonable wage reduction at this time is recognized as fully justifiable in view of the admitted decrease in the cost of living. That this increase is actual in spite of the persistence of some high charges, like rent, has been so clearly demonstrated as to be undeniable. Perhaps the most extended recent compilation on this point is that contained in the evidence submitted by the employing printers of New York in their recent arbitration case on wages.

Association's Publicity Section Is Doing Constructive Work

ONE of the most constructive pieces of work which the American Electric Railway Association has yet done is that which the Advertising Section of the Bureau of Information and Service is now doing. As the editors of this paper see it—and this opinion reflects the thought of many others—the Advertising Section is the correct answer to the question, "How Shall the Association Handle Railway Publicity?" In other words, the association is now organized to speak authoritatively to the public—to put the best thought of the industry into bringing out the public's problem from the public's point of view, as real news matter. And the Advertising Section is doing the job.

This section is organized for the purpose of providing a news service to newspapers and any other legitimate publicity medium in the effort to get the true story of the electric railway business before the public, for it is with the public that the railways do business, and in their hands, in the final analysis, rest the restrictions and privileges under which the railways have to work. Further, and even more important, perhaps, this section must open up the channels to these publicity mediums so that the copy is used and must establish a con-

fidence that the material furnished is legitimate, correct and real informative news, not propaganda. Another function of the section is to make a study of possible new methods of railway publicity. The movie is one example of this, as has been suggested in these columns from time to time. And the movie has been utilized, too. The movie "news" films were busy on Electric Railway Day, May 4.

Naturally the success of any such program depends largely upon the personality of those handling the work. The important fact about the present situation is that not only has the association adopted the right method, but it has apparently found the right man to carry it out.

That the section has been accomplishing results of real value to the industry is shown by the story of its work to date, printed elsewhere in this issue. Most companies have concrete evidence of some of this work in their own local press. The work now in hand and planned for the near future is of a most valuable nature and will doubtless have a real and far reaching effect. There has been more useful railway publicity in the past few months since this section was organized than the railways have had in the same number of years, and more of it is to come.

President Gadsden of the American Electric Railway Association is appealing this week, in the name of the Committee of One Hundred, for support of the Advertising Section. While this appeal is addressed, naturally, to the members of the association, it may well be heeded by railway and manufacturer companies who are not members, for this is a movement from which all benefit directly and indirectly. The Committee of One Hundred is a committee of the industry, but naturally turns to the association for machinery and a working organization to accomplish its results. This last sentence, by the way, seems to present good arguments why all railways and railway manufacturing companies should belong to the association and take an active interest in its work.

The association needs and merits support in this publicity activity.

Peace by Understanding in the State Where People Have to Be Shown

PEACE by understanding has been accomplished in a rate proceeding in Missouri. The case was that of the Kansas City, Clay County & St. Joseph Railway. As noted elsewhere in this issue, the company was seeking a 25 per cent increase in rates. First of all a canvass was made by the company to obtain the opinion of the public with respect to the company and its service. Next the need for the increase was explained and explained so well that there was no contention against the raise as a whole. The application for the increase contained less than 1,000 words. The testimony was brief, for the need for any protracted presentation had been removed when all the different parties with axes to grind had been brought together previously and a basis was established on which proper recognition of the rights of each was secured. As a result the company has obtained its increase, the utility of the service to the community has been preserved to its fullest extent and the relations between the company and its patrons have been improved immensely through a better understanding on the part of each of the problems of the other. The settlement reached so amicably undoubtedly would

have been impossible of attainment under any but the give and take attitude that was manifested after representatives of the company had pointed out wherein all stood to lose if any attempt were made by any party to the readjustment at insistence upon what it considered its inalienable rights. The story of this attainment is a concrete example of building better public relations that every one connected with the industry in an executive capacity owes it to himself to read.

Take an Active Part in Federal Government

WHAT influences a Congressman? Probably nothing else so effectively as a knowledge of what his constituents legitimately and conscientiously desire. If this is so, it is a duty as well as an opportunity to let representatives in Congress know what is desired and what is felt to be necessary. If one has any influence, he should exert it.

There are several outstanding questions today which are receiving more or less public notice, but particular attention is here called to the questions of taxation, federal reorganization and additional appropriations for certain departments to do specific work which is much needed.

This week President Gadsden spoke before the Senate finance committee with reference to public utility taxation. Ideas are only commencing to formulate on federal taxation and that question will be treated further in these columns as matters develop.

Government reorganization, however, is a vital matter already advanced considerably in congressional study and every impetus which can be given this most desirable move is worth while. The government is primarily an organization to serve the people in their daily individual and collective pursuits, but at present its cluttered up and ponderous, complex and illogical organization reduces its efficiency to an absurd point. Intelligent reorganization is needed and should be supported on the basis of grouping together those functions which are devoted to a given purpose. The administration is making an honest effort to see that it is done right and soon and needs support. The longer the organization is allowed to run as it now is the harder it will be to change it effectively, for a new administration soon gets settled in its ways.

The question of additional appropriations is a complex one and many of its angles are more political in nature than otherwise. But it is worth while pointing out the facts in connection with the requests of the Department of Commerce, which is most closely connected with the industrial and business situation. Herbert Hoover, Secretary of Commerce, has come into the Cabinet with the idea of making his department a real aid to the industry and commerce of the nation. He has called into counsel able representatives of the various lines of industrial and commercial activity and is fast coming to a conclusion as to how best the department may function to provide a service which will really aid business. He finds that, with the appropriations available for the remainder of the fiscal year, he is handicapped in, if not actually prevented from, performing this service and has asked Congress for something over \$600,000 additional. In a way this \$600,000 is in the nature of a capital investment, for Mr. Hoover contemplates a return of \$1,500,000 from other directions if he can carry out his desires.

This request should be supported actively. Only this week Julius Kruttschnitt, chairman of the board of the Southern Pacific, points to the business depression as being beyond the state that railroad rates can affect. The point now is that Herbert Hoover has a plan to help and help quickly. Among others, the editors of business and technical papers have been given the opportunity of analyzing his requests and of cross-questioning him on his plans and methods. They are sound and practical.

Congress should be pressed to act in these matters. The way to do this is to write to the Congressmen. The time to do it is now.

Minnesota Takes a Forward Step in Electric Railway Franchise Law

IN HER new law enlarging the functions of the Railroad and Warehouse Commission, Minnesota has included a clause with reference to indeterminate franchises which should be appreciated concretely by railway companies in Minnesota, and, to a certain extent, though perhaps abstractly, by railways in other states which have not progressed so far in franchise law. The state, in Minnesota, has assumed the responsibilities which a state should assume when it starts to regulate utilities. Regulation by the state is the proper policy, but only when the state can contribute something by its regulation, and this Minnesota now does.

For the future, all railway franchises in Minnesota are, at the option of the company, made indeterminate, whether they are now term franchises or not. This applies, however, only in case the company is a Minnesota corporation. No other provisions or requirements of the existing franchises are modified. Except by future legislative action in line with the police power of the state, such indeterminate franchises may be terminated only upon purchase of the railway property by the city on one of three fair bases of price determination provided in the law.

The law is clean cut in giving to the City Council, without reference to a popular vote, the right to grant franchises. The Council also has control over service standards, routes, etc., and its decisions are not subject to appeal. The commission, on the other hand, has initial and exclusive power over fares and charges, subject only to appeal to the District Court. The commission also has supervision over security issues.

Perhaps the most peculiar—and questionable—provision of the law is that which makes all cities flat fare cities with full free transfers and retransfer privileges. This provision of the law is a formal recognition of the conviction of one large element, and probably the predominating element, of the American public that cities, at least those of moderate size, should be on a flat railway fare basis. It does, however, preclude any experi-

ment of investigation of other means of charging for street railway rides.

Another somewhat peculiar provision is that "all cars used shall be of modern design and . . . shall at least equal in quality, style and design cars now operated in such city." It is the latter part of the quotation which particularly attracts attention, as it might be hard to tell what equality in design means.

The law on the whole, however, is an advance. Its provisions should stabilize the electric railway industry in Minnesota, for the state now practically guarantees fair treatment to legitimately invested capital. First it provides, at least by inference, that fares may be charged sufficient to yield a reasonable return on a fair valuation. Second, it makes obligatory the purchase by the city in case the city desires to terminate the franchises.

As noted last week, the Duluth Street Railway has already elected to come under the provisions of the new law. This is at least an indication of its value, as seen by those most affected by it.

Avoid a One-Sided View of the Budget System

THOSE who look upon the budget plan as merely a scheme for cutting expenses regardless of results are not aware that its function is three-sided. It acts, of course, to eliminate waste, but it also serves to encourage investment in expense-reducing equipment and to stimulate revenue production. This fact has been illustrated in several articles on budgets which have been presented in recent issues of this paper. The latest was that outlining the plan in use on the Rochester & Syracuse Railroad appearing in the April 30 issue. The plan was commented on editorially in the same issue. It is essentially like other successful plans in that it depends for its best results on co-operation, and only with co-operation can the highest degree of long-run economy be secured.

These remarks are prompted partly from observation of the inability of some department heads to get the money for equipment and construction which will surely pay by returns on the investment. The answer is usually: "You have proved your case, but we haven't the

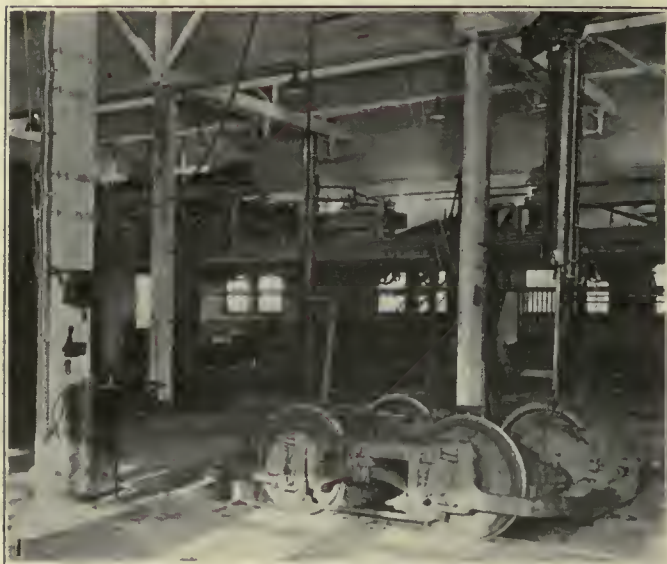
money"; and this answer, unfortunately, is often correct. But if an expenditure will pay a return of, say, 25 per cent on the investment, it ought to be possible to get the money. The budget will help to do it by insuring the best possible distribution of available funds and by demonstrating the necessity for getting in more revenue. Under a system, or lack of it, by which the several departments are not kept informed of all details of the finances, each head is apt to push for all he can get, regardless of the effect on others. A good budget plan eliminates this.

Quotation from the Federal Electric Railways Commission Report

No. 20

TO A degree unknown to private business enterprises, which to a certain extent are able to finance capital expenditures from earnings, the electric railways are dependent upon new investment—new capital—for the extension, improvement and betterment of the service which they perform. Communities need and are constantly demanding additional local transportation facilities. They require large sums of money, which can only come from those with savings to invest. When the flow of new capital ceases, when the confidence of the investor in the ability of the enterprise to safeguard the integrity of the investment and to insure a fair return thereon ceases, new capital is unobtainable and the utility can no longer serve the purpose for which it was created. This condition is now present. Lack of confidence in electric railway investment exists today to a degree which has caused a partial paralysis, is working havoc with the finances of the companies and is depriving the public of the service to an alarming extent.

Former Horse Barn Makes Good Shop Building in Calgary



1. Air hoist and arrangement for operating trucks under their own power.
2. General view of Calgary shop.
3. Construction view of shop steam pipe line.

4. Shop building Calgary Municipal Railway.
5. Expansion bend in shop steam line.
6. This is a glance at the truck section.
7. Machine shop is roomy and cheery.

Recent Developments at Calgary

A Shop Evolved from a Horse Barn; an Attractive Resort, Bowness Park, and a Convenient Sand and Fuel House Are Among the Outstanding Physical Improvements on This Alberta Municipal Property



COAL, SAND AND WOOD STORAGE BUILDING, WITH SAND TOWER AT RIGHT

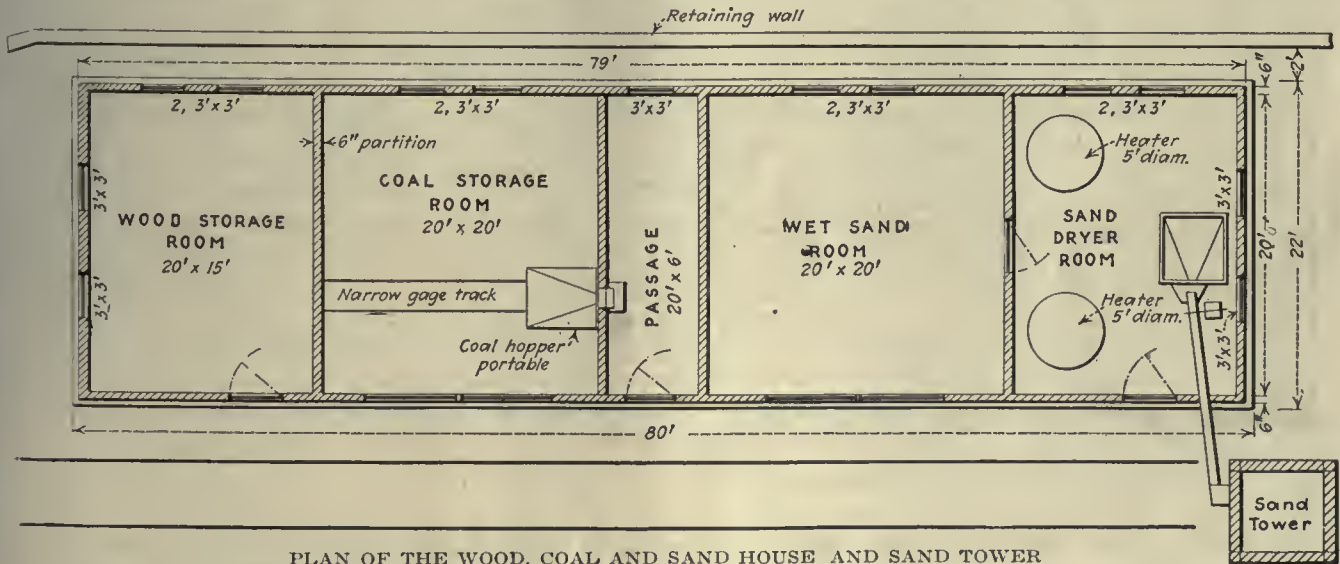
THE Calgary Municipal Railway operates 83 miles of track in a city having a population of more than 75,000, which is spread over an area of 40½ square miles. The population density is low, rendering the furnishing of profitable electric railway service a matter of some difficulty.

The electric railway department is at present combined with the lighting department under the immediate direction of R. A. Brown, who has the title of general superintendent of electric light and railway departments. The two departments were combined after the resignation of Thomas H. McCauley as superintendent of the railway department early in 1920. Mr. Brown reports to Commissioner A. G. Graves, one of

the three commissioners who look after the city government, the other commissioners being the Mayor and the commissioner in charge of public works. Mr. Graves has supervision of public utilities.

Calgary, like other cities in western Canada, was overbuilt during the boom years between 1909 and 1913, and the electric railway service was correspondingly expanded in the expectation of a continuation of the expansion of those days.

The war brought a tremendous reaction. As reflected in the electric railway traffic, the reaction was indicated by a falling off in numbers of passengers carried annually from 24,000,000 in 1913 to 17,500,000 in 1916. In 1920 the number carried was 17,091,356. During the



PLAN OF THE WOOD, COAL AND SAND HOUSE AND SAND TOWER

wartime slump the railway found itself with more track and cars than it needed. There was also a critical shortage of men to operate the system. This situation was met by the changing over of the cars to one-man operation under the direction of Mr. McCauley. This change was so significant that it deserves now a few words of review in the light of the intervening progress in this line that has been made. The situation was described at the time in an article by Mr. McCauley, published in the Sept. 22, 1917, issue of this paper.

Beginning in 1914 with one-man operation of some single-truck cars on three outlying lines, this type of operation was gradually extended and applied on double-truck cars until in 1917 there were forty-two one-man cars in use, of 32 ft., 41½ ft. and 46½ ft. lengths. In remodeling the existing rolling-stock the railway department used a plan devised by Mr. McCauley, in which the passengers enter through a doorway which replaces the right-hand panel of the front of the vestibule. They are thus faced by the operator as they enter, facilitating the collection of fares.

SHOP FACILITIES RECENTLY GREATLY IMPROVED

With the above few historical data as a background, it will be of interest to note the most important of the recent developments on this municipal property. After the armistice was signed, Superintendent Brown was able to secure for the railway department a building formerly used as a stable for the city public works department. It was located near the former over-

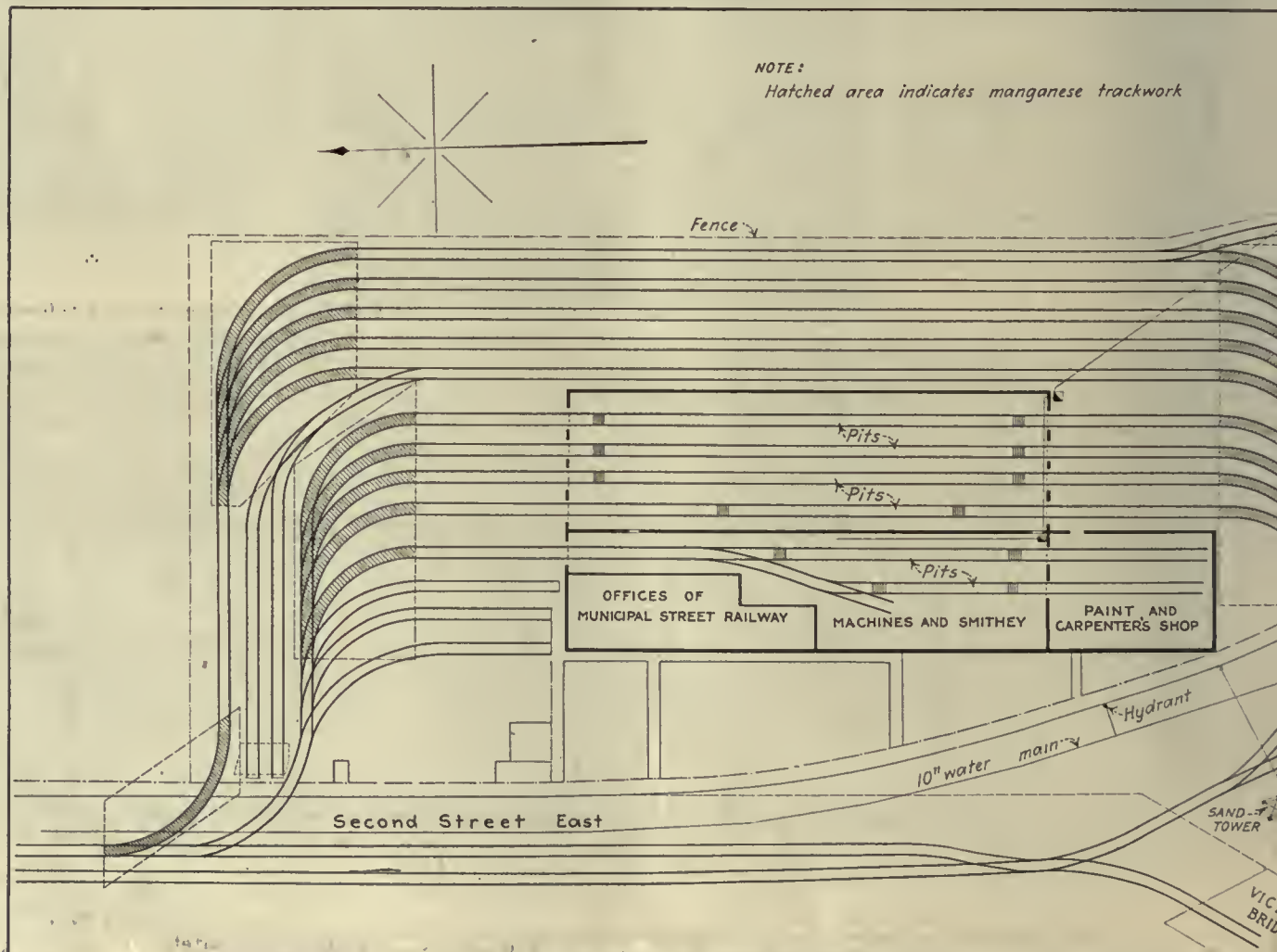
crowded carhouse, shop and office building, as is shown in an accompanying plan.

The shop building is of brick and frame construction, and it formerly contained two floors. The lower floor was used as a stable and the upper as a hayloft. In the reconstruction the second floor was removed and wooden trusses were installed to support the roof. The material reclaimed furnished nearly enough lumber to make all of the alterations. The windows in the side walls were enlarged also and, after completion of the work, there remained a light, airy building well suited for shop purposes.

The general layout of the shop is indicated in the plan reproduced. The following are some details:

The paint shop is completely inclosed with brick firewalls which were a part of the original building. The ceiling of this shop is of wood, covered with sheet metal. Rolling steel doors are used to close doorways in the exterior of the building. A hydrant is located in this shop for fire protection so that the remainder of the building is fairly well protected from the effect of fire which might arise in the paint shop.

The machine shop is located alongside the paint shop. This contains a corner for the blacksmith, this corner being furnished with a forge, a mechanically driven hammer and other miscellaneous forging equipment. There are also here a large wheel lathe, a hydraulic press, a machinist's lathe, a pipe-and-bolt cutter, an emery wheel stand, a drillpress, a hacksaw and a babbiting bench.



LAYOUT OF CALGARY MUNICIPAL RAILWAY'S SHOP, OFFICE AND CARHOUSE PROPERTY

The carpenter shop is provided with a balcony which furnishes a convenient support for the shafting for the heavy machines placed on the main floor. Above the balcony are a few woodworking machines, several benches and a lumber drying rack.

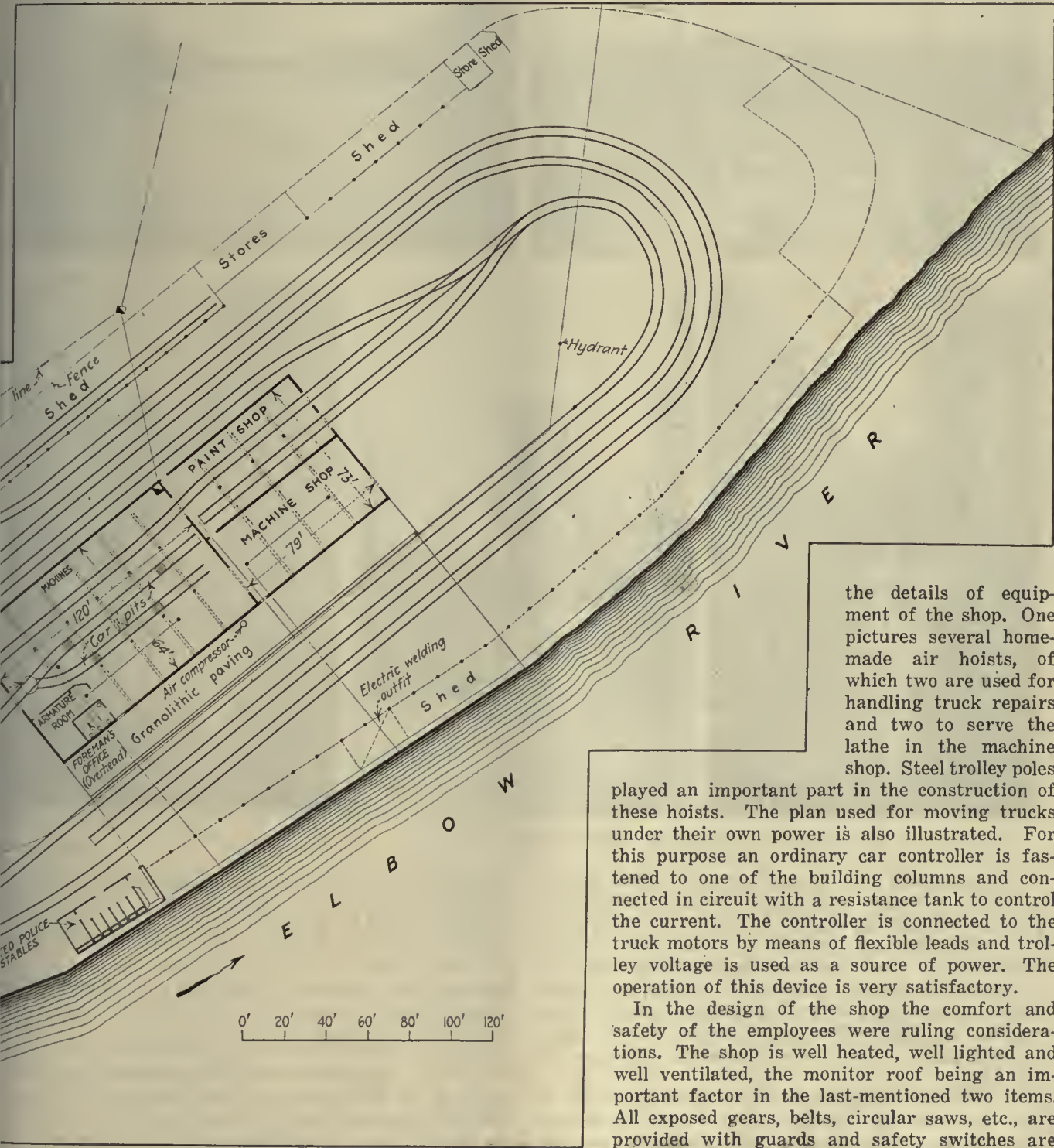
Opposite the carpenter shop is the truck repair shop, together with air compressor and controller repair benches. This shop contains also an air compressor of a capacity of 50 cu.ft. per minute with a receiver located out of doors.

The front end of the building contains a toilet room and an armature room with office and storeroom above. The armature room is provided with a monorail hoist for handling armatures. It is planned in the future

to install also a Universal armature machine in this room. Here is also located a Century electric armature and field tester. Insulation tests are made by applying the trolley voltage of 550 to the armature.

Considerations of economy made it necessary to use wooden doors covered with sheet metal in the front of the building, although it was realized that these are more difficult to handle than the rolling steel doors used elsewhere in the building. In addition to the lower cost, the heat non-conductivity of the wood was a factor in heat conservation, which is considered to be a very important matter in a climate as cold as that of Calgary.

Photographs have been reproduced to show some of



the details of equipment of the shop. One pictures several home-made air hoists, of which two are used for handling truck repairs and two to serve the lathe in the machine shop. Steel trolley poles

played an important part in the construction of these hoists. The plan used for moving trucks under their own power is also illustrated. For this purpose an ordinary car controller is fastened to one of the building columns and connected in circuit with a resistance tank to control the current. The controller is connected to the truck motors by means of flexible leads and trolley voltage is used as a source of power. The operation of this device is very satisfactory.

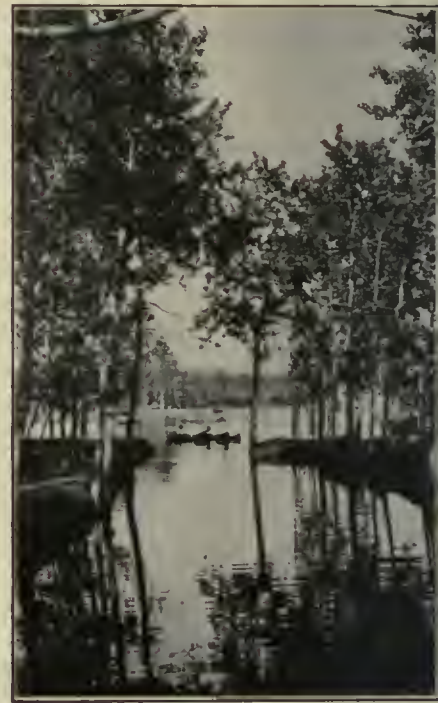
In the design of the shop the comfort and safety of the employees were ruling considerations. The shop is well heated, well lighted and well ventilated, the monitor roof being an important factor in the last-mentioned two items. All exposed gears, belts, circular saws, etc., are provided with guards and safety switches are installed on all motors.

The shop department has made an excellent start in the direction of electric welding, a special booth out of doors having been provided for that purpose. The location of this is shown in the plan. Here worn-out gear cases, broken castings and other parts are repaired, and the welding outfit is also useful to the track department in building up cupped rail joints.

A large saving was made in the heating of the shop by connecting it by means of a well-insulated pipe line with the municipal power plant located 2,000 ft. away.

because of the difficulties of securing sand in the dead of winter. Mr. Brown has, therefore, given special attention to the design and construction of a building for the storage of these necessities and for the drying and delivery of the sand. The plan of the building is shown on page 887. It provides bin capacity for storing about 100 tons of coal and 120 tons of sand.

In the coal storage room is located a hopper, mounted on trucks, and bags are filled in the passageway from this hopper. Sand is dried with natural gas heaters



VIEWS IN BOWNESS PARK, WHICH DEMONSTRATE THAT MUCH HAS BEEN MADE FROM LITTLE

Two illustrations show respectively the method used in insulating the steam pipe and in installing a horizontal gooseneck to take up expansion. The pipe, surrounded with a magnesia and tar paper covering, is laid in split tile directly in the ground and at an unusual depth, out of respect to the soil-penetrating qualities of winter's cold. The gooseneck is in a two-division concrete-walled chamber, designed in this way to permit deformation of the bend and to furnish ample support for the cover and soil above.

On account of climatic conditions large quantities of coal and wood are required in the winter for heating the cars, for which purpose hot air heaters are used. It is necessary also to store a great amount of sand

in the sand-drying room. It is transferred from the heaters to a concrete hopper, where it is screened, and is then elevated by a bucket conveyor to a sand tower which has a small storage capacity and which is conveniently located for a supply of sand to the cars. From the tower the sand drops by gravity, and a rubber hose is used to direct the flow into the sand boxes in the cars.

BOWNESS PARK IS ATTRACTIVE AND PROFITABLE

The city of Calgary is not well provided with public parks, so that the park maintained and operated by the railway department, about 7 miles west of the city on the Bow River, is a real factor in providing recreation for Calgarians. The accompanying group of typical

views in the park furnish all needed commentary upon the success of the railway department in building up an attractive resort. From these pictures it is difficult to realize that this attractive park is almost entirely artificial, much ingenuity having been expended in diverting water from the river and directing and impounding it by means of dikes. The waterways were fixed up to provide boating and bathing facilities for the railway patrons and every effort was made to provide for the general comfort of the public. The catering privileges in Bowness Park are leased out for \$3,500 per season. Round-trip tickets to the park are sold for 20 cents, and a considerable source of income for the railway department has thus been created.

Gasoline Motor Driven Car Tried

A CAR propelled by a gasoline motor and designed to supplant branch line trains and interurban electric cars is being exhibited and operated in St. Louis, Mo., by the Bowen Motor Railways Corporation of St. Louis. The car is being operated daily from Union Station, St. Louis, traversing the Creve Cœur branch of the Missouri Pacific Railway to Creve Cœur Lake. The actual running time for the round trip, a distance of 40 miles, is two hours and thirty-four minutes. About 5½ gal. of gasoline is consumed, which is an average of about 7 miles to the gallon.

The motive power of the car is a 50-hp. gasoline motor, which is slung in front of the body of the car and has a hood covering similar to that of an automobile. The car has a drive shaft like that of a motor car and the power is conducted to the rear wheels through a differential.

The body is similar but shorter than the ordinary electric car. It will seat thirty-five persons and the engine has enough power so that a trailer can be attached if necessary. Electric lights and hot water heat are part of the equipment.

Electrification Progress in Brazil

ELECTRIFICATION in Brazil is expected to take on considerable activity this year. A recent report in the *Wall Street Journal* states that a bill authorizing the first step of the electrification of the government-owned Central Railway of Brazil has been passed by Congress and a decree to that effect has been issued by the President. The first step includes electrification of numerous suburban lines out of Rio de Janeiro and lines running into Sao Paulo. An expenditure of an amount equivalent to about \$10,000,000 under normal rates of exchange has been authorized. A year ago the Brazilian Congress voted \$500,000 for an extensive survey. This will be the second large electrification project undertaken in Brazil. The other is the electrification of 28 miles of the Paulista Railway, begun last summer and to be completed about June, 1921.

During the war work on extensions of the Metropolitan Underground Railway in Paris practically ceased because of the scarcity of labor. Later financial conditions forbade much new construction, but reports from Paris indicate that an extension of line 7, in some respects the most interesting of any from a construction standpoint, is now being completed. It extends from the Palais Royal under the Louvre and then along the river bank to the Hotel de Ville.

Omissions in Inventories

A Carefully Conducted Appraisal of an Electric Railway Property Made Recently Disclosed Omissions in Previous Appraisals Amounting to 7.75 per Cent of the Total Valuation

BY LESLIE F. VAN HAGAN

Professor of Railway Engineering, University of Wisconsin

THE term "inventory," as used herein, means the listed items of physical property that make up a plant. In making an appraisal, the first thing to do is to list all physical property. Those who are familiar with appraisal work know that the chief difficulty in preparing an inventory is to find all of the property. The errors of inventory are usually errors of omission. Engineers recognize this condition and provide for it by adding to the value of the property an amount which they consider sufficient to cover "omissions and contingencies." It is usually computed as a percentage of the value of the property. It should be understood, also, that the omissions which the engineer attempts so to cover may be omissions in pricing as well as omissions in inventory.

Just how much of an allowance should be made to cover this item has been a matter of pure speculation. So far as the writer knows, no actual statistics have been brought forth at any time in support of the various allowances that have been used. The allowances have been "guessed at" and supported by the test of "reasonableness." Under existing circumstances that is about all that can be done, but obviously it would be desirable to have concrete information on this point. The purpose of the present article is to contribute a bit toward the accumulation of such information.

The writer was recently called upon to review appraisals of the same street railway property that had been made by the same public utilities commission at periods several years apart for the purpose of determining the reason for certain apparent inconsistencies. It was evident that increases in the appraised value of the property would arise from some or all of the following sources: (1) Additions to the property; (2) increases in unit prices; (3) increases in overhead allowances, and (4) more careful inventorying that would reveal hidden quantities. Without going into detail about methods, it may be simply stated that it was finally determined that there had been an increase in the latest inventory, arising from more thorough inventorying, that amounted to 7.75 per cent of the physical property that had existed at the time of the preceding inventory. That is to say, the evidence was that the earlier inventory showed only 92.25 per cent of the property that the later inventory showed was in existence at the time the earlier inventory was made.

This figure of 7.75 per cent is somewhat startling. The writer knows of no appraisal made by a public utilities commission in which so high an allowance for this item has been allowed to stand. On the other hand, he knows of no previous attempt to determine definitely what degree of accuracy is actually attained in inventorying property. The allowance percentages that are used are largely matters of custom and are copied from one appraisal to another. An allowance of 2 or 3 per cent has been commonly used by state commissions.

There can be no denying that the degree of accuracy varies for various inventories. Even if 3 per cent be

accepted as a fair average allowance for "omissions and contingencies" it is to be expected that, in some cases, the actual percentage will be higher and in some cases it will be lower. In other words, the conditions under which an inventory is made will affect its accuracy. It is of interest, therefore, to note the conditions under which these inventories were made.

CONDITIONS UNDER WHICH THE APPRAISALS WERE MADE

There have been three appraisals of the property in question, one in 1907, one in 1910 and the latest in 1914. In all three the street railway company and the commission co-operated in varying degrees. In preparing the 1907 inventory it was originally agreed that the inventory would be furnished by the company and priced by the commission, but the company was so slow and indifferent that the commission had to do a large portion of the inventorying. The president of the company stated frankly that he regarded the appraisal as being intended for taxing purposes, and the company representatives guided themselves by his attitude. The company was in a better position than any outsider to inventory the property, and without the company's complete co-operation the work proceeded under a decided disadvantage. The resulting appraisal was obviously faulty and was soon superseded by the 1910 appraisal.

When the 1910 appraisal was made the question of rates had become predominant and the company's policy had begun to change in the direction of securing as high a valuation as possible. There was greater co-operation between the company and the commission in preparing this inventory, but they did not work under a thoroughly planned scheme that fixed definitely the activities and responsibilities of each party. The commission depended largely upon the company for the inventory, but the company had not yet reached a full appreciation of the importance of making a complete inventory nor the fact that it would have to organize especially for the work. Regular employees were called upon to devote to the inventory such time as could be spared from their regular work, with the result that the inventory received secondary consideration. The commission's engineers supplemented the company's efforts. They had access to company records, but the records, particularly for property acquired many years before by purchase, were not all that could be desired. There was not time to make thorough field surveys, so various short cuts and approximations were necessarily used. It is not surprising, therefore, that the result was imperfect.

The rate question continued to increase in importance, and the company finally awoke fully to the fact that it was to the company interest to have a complete inventory of the property. After some consultation with the commission's engineers and statisticians, the company began to make such an inventory. An organization was set up which developed as the work proceeded until it assumed fairly large proportions. Field parties were sent out, and, at the same time, company records were searched for information that would throw light upon the task. When the inventory was complete it was turned over to the commission's engineers to be checked and priced. The commission's engineers checked approximately 10 per cent of the company's inventory upon the theory that

a 10 per cent check would reveal the degree of fairness and accuracy of the company's work. Whenever, in the case of a given item, the check proved unsatisfactory a more complete check of the item was made. Where it was possible to do so, the 1914 quantities were compared with the corresponding 1910 quantities and the differences were satisfactorily explained or corrections were made. The two sets of engineers—those of the company and those of the commission—worked upon the principle that inventory quantities are matters of fact about which there should be very few differences of opinion. In general, the company's work proved to be fair and accurate. In spite of the careful work of the company in making the inventory, it cannot be claimed that it is perfect. The company learned many things about inventory methods during the progress of the work that it would undoubtedly use to advantage if it were to make a new inventory.

GRADING, LONG FORGOTTEN, HAD BEEN DONE

Although the indications are that much property included in 1914 was omitted in 1910, it is not possible to point out exactly what the omitted items were. All that can be stated definitely is that the property shown in the 1914 inventory was actually there. Some few of the omitted items, however, can be identified. For example, a search through old franchises and deeds revealed a number of places where the company had been obliged to do grading that would not be picked up by a field inventory party. One such piece of grading contained nearly 140,000 cu.yd. of material. Again, the company investigated a number of heavy embankments on its interurban lines, where records showed that there had been trouble from settlement during construction. A well-drilling outfit was used and holes were bored through the embankments in a number of places. About \$150,000 worth of hidden grading material, not included in the 1910 inventory, was discovered and added. These instances are offered not only to illustrate why property is sometimes overlooked but also as a sidelight upon the efforts that were made in 1914 to find all existing property.

The writer is not interested particularly in seeing a higher figure established for the allowance for omissions. As an engineer he is not ready to admit, until confronted by convincing data, that it is impossible to attain a 97 per cent result in inventorying. Inferentially, the smaller the allowance an engineer makes for omissions the higher is the quality of his work; engineers in the employ of state commissions are going to keep the figure for omissions as low as possible. At the same time it seems evident, from the facts here presented, that there may be justification for breaking away from the figure of 3 per cent when conditions make it seem advisable. If we accept a 3 per cent allowance for omissions in inventory and pricing as an average figure (perhaps it should be considered the minimum figure), variations from that figure should be permitted whenever the conditions that surround the making of the inventory justify them.

Without doubt there are figures in the possession of various state commissions that would establish the limits within which the allowance should vary. It would not be difficult to make studies similar to that upon which this paper is based, and the information would be well worth the trouble.

Engineer vs. Auditor in Cost Keeping

A Conference of These Department Heads with the General Manager
Brings to Light the Common Controversy and Points Out
the Moral in an Interesting Colloquy

By E. A. W.

"WHAT does this mean, \$14,000 for an extension of our 60,000-volt transmission line up Dry Creek and we are going to abandon that line next year?" It was the general manager talking, and he had the chief engineer seated before him. "You told me before you started the job it would not run over \$10,000."

"We based our estimate on figures given us by the cost department," replied the chief engineer. "To be sure we didn't go into details. You were in a hurry and we supposed the cost department figures on the Bear Cañon extension would be close enough. The two extensions are almost identical."

The general manager, or "old man" as he was popularly called, sent for the auditor. Upon his arrival he went into executive session on the subject of costs, cost-keeping, cost analysis, and proper preparation of estimates, with the chief engineer and auditor.

There were many opinions and thoughts uttered. The auditor got his back up at one stage of the game and declared his department should not be held responsible for detailed cost data, that the compilation of such information was an engineering function. This argument was joyfully received and acquiesced in by the chief engineer. The general manager threw a bucket of ice water on the proposition by declaring that cost data, to be of value, must check precisely with the general books, and he was agreeable to the cost records being kept by the engineering department provided the auditor would vouch for their accuracy and be willing to take the stand before a court or the utilities commission and swear to values by quoting and use of such data.

It is needless to remark that the auditor failed to agree to any such arrangement, but the general manager's proposition placed the thing in a new light. It brought out the indisputable fact that cost records to be of value and free from attack must balance with the general books.

"What do we want cost data for anyway?" suddenly asked the G. M. "I'll bet each one of us has a different reason." The auditor spoke first: "I'm not so much interested in detailed costs and quantities as I am in totals. As long as I can keep my books straight as regards additions to property and retirements of property, and not mix construction and maintenance, I'm satisfied."

COSTS FROM THE CONTROL STANDPOINT

"I need to go further than that," volunteered the engineer. "I want detailed data for estimating purposes and to check against quotations from contractors and firms doing work for us. I need costs and quantities in quite considerable detail to enable me to prepare my monthly and yearly budgets."

"Your needs are important and coincide with mine

to a certain degree," said the G. M., "but I go you a step further and will probably surprise you when I say costs are of paramount importance from a control standpoint and you have both overlooked what to me is their major value."

"Control standpoint!" both the auditor and engineer unisoned, "what have we been talking about?"

The G. M. smiled. "To bring out my point, will you both agree that as our cost estimating works out at present we use it mainly for post-mortem analysis? We can very profitably use it to predict or pre-plan with. As an illustration of what I mean, you, Mr. Engineer, can lay out on paper a proposed transmission line, tell exactly the size of copper wire needed to carry a given amount of electrical energy to a certain point. You know in advance what your electrical losses will be and just how far apart the wires must be placed to avoid short circuit. You can figure to within one of the number of poles needed, and just what additional electrical load your generating plant will have to supply. If the generators are not of sufficient electrical capacity to supply the additional energy needed, you can lay out on paper a new generator and tell before a single workman has started its construction just what energy you will get from it; and furthermore, its efficiency. A navigator can lay out his course while in port and follow it on the high seas until it finally takes him into the port of destination. Don't you see it now, the electrical engineer and navigator can tell accurately in advance just what the results of their calculations will lead them to, and by mathematics find out the most efficient design or most expeditious course to follow?"

"Yes, but don't we also use cost data for the same purpose?" spoke up Mr. Engineer. "We make out our cost estimates in advance of a job."

"To be sure you do, and always allow a good margin for contingencies," said the G. M., "and how often do you put in revised estimates when a job is half way along? I would like to see cost data used scientifically to plan a job. By such use we should be able to pre-determine methods and results from a cost standpoint as well as we do now from design."

"I see where I have got to change my viewpoint," said the auditor. "My training for years has been along lines of investigation and audits."

"No, I don't agree that you should change your viewpoint in the least, Mr. Auditor, but you can, with considerable profit to yourself, enlarge it. For years your training has been balancing income and outgo, debits and credits, as well as balance sheets for a busy directorate and the treasurer. Physical quantities and their value, labor hours and production per labor hours, changes in methods and ensuing results have made impressions but have been pushed aside for debits and credits and balance sheets."

"You're right, G. M.," and the engineer pounded the table before him. "At the last meeting of our Engineering Society almost an entire session was devoted to lambasting accountants for not revising their ancient methods of cost accounting. Solomon's bookkeepers used the same general scheme when the temple was built that most accountants have today, and like Masonry, it has been handed down intact through the ages."

"I seem to be getting mine at this pleasant little knocker's convention," crisply interjected the auditor. "Well, go as far as you like. I'm here to learn, but Mr. Engineer, don't throw out your chest with righteous indignation and imagine yourself the most abused person on earth. If I recall correctly, you seemed satisfied with things when we started this conflict. Let me say, however, while I have the floor, that under our present method of cost accounting a great part of the accuracy of our records devolves upon your organization. For example, if you can't get your foremen to turn in proper time cards and quantities used, what can my cost clerks do?"

"Righto," came back Mr. Engineer friend. "We have not been as careful or strict as we should have been, but now that the subject is opened up, I'd like to say that my field forces are hired to use tools and not to push pens and pencils. I want to say also that cost reports mean nothing in my pure young life but a check against estimated costs. I haven't the time to study the detail sheets, new estimates require all my attention. I wish we could revise and better our methods of making up estimates so they would be more complete."

"You fellows seem to be working up to the point I am striving for, and that is to reduce the clerical work of our supervisory staff and field forces to an absolute minimum, and at the same time secure the maximum results from a cost control standpoint. To accomplish these two results our cost department must give more attention to its work than ever before, for we will look to it for control. Today the auditing department and engineering department pass the buck to each other whenever a question arises."

The manager reached in a drawer in his desk and pulled out a bunch of estimates, or work authorizations. Turning to the chief engineer, he said: "Here is a job showing a probable expenditure of \$8,000 for a new transmission line to the Hurricane Coal Company's property. No doubt the quantities shown are fairly accurate, but what did you base your labor costs on?"

"I presume the superintendent of lines followed his usual custom and guessed so many men for so many days, digging the dope out from the experience file he carries on his shoulders."

"Just so, all right. Now suppose when you first learned that this line was to be built you had given the cost department the size of wire needed, type of insulation, hangers, cross-arms, height of pole, length of line, all on a blueprint, with special reference to any unusual matters not ordinarily encountered, and they had shortly thereafter handed you a complete itemized estimate, what would you do?"

"Say, Boss, I'd throw a fit," the engineer laughed, "and after I had come out of it, I'd say the estimate was crazy and, without wasting time to look it over, have the line department make a real one."

"Well, now, suppose some more," continued the G. M. "Let's assume the estimate was correct, more so than

many an overworked superintendent could prepare. Would not such knowledge be of greater value to you than all the post-mortem cost analysis made up?"

THE ENGINEER AND AUDITOR SEE THE POINT

The chief engineer was thinking and thinking hard; he had the light of a new idea in his eyes; even the grizzled old auditor was doing some. The latter was aware of the oft-repeated complaints of his cost clerks that the operating heads did not make use of the carefully detailed and elaborate cost statements issued from their department. It was dawning on the auditor that it was a proper function of the cost department, rather than that of the operating department, to analyze and question.

The discussion between the general manager, auditor and chief engineer gave each one a new perspective. The engineer saw the relation of cost preparation to design. The auditor saw a neglected function, which, properly set in motion, would make his department a greater help in administrative control, and at the same time insure more accurate bookkeeping. The general manager visioned greater operating efficiency and control through direct comparison of statistics prepared by an unbiased, disinterested, organization.

To be sure the engineer wondered if adopting such methods of cost estimating would not result in endless explanations, but the opportunity of securing cost data carefully prepared and showing comparisons offset the thought. He was interested in output per labor hour more than in cost per unit.

The general manager knew a new day in cost accounting was dawning, when methods and results would be firmly bound together, inefficiency in the first quickly shown in the second, where idleness, lost time, inadequate machinery, inefficient working forces, lack of facilities, would show up promptly. He knew that the determination of costs in advance, instead of piling up complications of past results, gave him a better grasp on causes, which is the main idea in control.

It was gradually dawning on the auditor that his cost system was woefully lacking and incorrect in its application, that cost statements were not being analyzed with the idea of reducing wastes, but rather as an index of the guessing ability of the estimator. He understood that before any job could be started somebody had to outline why it was necessary, what was to be used, where it was to be used, when it was to be used, how it would be done. But his job would be to show if the job was warranted in view of its cost, and this big "if" should be known before and not after the work was started.

White Line Shows Swing of Cars

IN THE heavy traffic sections of Youngstown, Ohio, the local police department has had white lines painted on the pavement to indicate the clearance necessary for the swing of the street car platforms. These lines are a great help, it is claimed, in preventing collision of the cars with pedestrians or automobiles. However, in connection with the use of these lines, it is pointed out that they serve simply in the nature of a warning to the driver of an automobile or a pedestrian and help him in making sure that he is in the clear. The presence of the line does not absolutely prevent an accident and in no way relieves the street car man of his share of responsibility.

Selling Rides in a City of 6,000

Interesting Experiment During Nine Months of 1920 in Selling Twenty-five Tickets for \$1 at Nelson, British Columbia, Pushed by Woman Chairh Fare Bringing Less Today—High Percentage of Grades and Curves Has a Tendency to Discourage Walking



VIEW OF NELSON ON KOOTENAY LAKE

NELSON, British Columbia, with its population of 6,000 and a street railway of but 2.5 miles route (4 miles single track in all), does not seem at first blush likely to offer any experience in the matter of selling electric railway transportation. Nevertheless, the very fact that no healthy persons in Nelson (and most of them are healthy) have to use the trolley gives point to the experiment made by this municipally owned road. A rather high percentage of grades and curves is about the only thing to discourage walking.

The earliest fare prevalent on this road was the eight-for-a-quarter ticket and 5-cent cash fare in use from 1910 to 1915, no change having been made in rates when the city took over the railway in 1914. In 1916 war increases made it necessary to sell the tickets at the rate of six for 25 cents, and in 1918 the cut-rate ticket was given up for a straightaway cash fare of 5 cents. As it happened, the years 1918 and 1919 were among the most active in the history of the community, with the result that 1918 at 5 cents showed more passengers and revenue than most of the corresponding months of 1917, while 1919 made a still better showing in comparison with 1918, the increase in passengers being from 299,516 to 364,839 and in revenue from \$14,976 to \$18,201.

However, there was then (1919) on the Board of Aldermen an enthusiastic believer in greater usefulness of the street railway in the person of Mrs. W. Garland Foster, chairman of the street railway committee. While acknowledging that the 5-cent fare had done well, she held the opinion that a twenty-five for \$1 ticket would

do still better if the right push were put behind the bargain rate. One member of the committee was with Mrs. Foster, another was opposed and a third was a benevolent neutral. When the matter was brought before the municipal council there was strong opposition, headed by the Mayor and by an Alderman who has since succeeded him in that position. However, the plan went

TABLE I—COMPARISON OF LIKE MONTHS OF 1920 AND 1919

Month	Increase in Passengers
January.....	10,604*
February.....	6,774*
March.....	3,275†
April.....	6,338
May.....	5,590
June.....	3,067‡
July.....	7,738
August.....	7,633
September.....	5,880
October.....	5,482
November.....	3,930
December.....	2,043

* Exceptionally good weather; 5-cent fare.
† Last month of straight 5-cent fare.
‡ One car out for repairs three weeks.

through in April, 1920, and was continued to the end of December, 1920. At that time a combination of circumstances, especially the large cost of securing a supply of new tickets, the coming in of a new council and the hope that still larger revenues were possible, led to the return of the 5-cent fare. Mrs. Foster did not object to this decision, believing that time would tell whether the psychological appeal of the reduced rate was or was not as good as she believed. As a matter of fact, January, 1921, shows a drop to \$1,512.35 at 5 cents compared with \$1,643.95 at 4.66 cents fare in December, 1920. But it

may be that the storms of January, 1921, had as much to do with this as favorable weather did with the January, 1920, returns, which were \$1,674.50 at a 5-cent rate of fare. In any event, this has been the course of affairs.

COMPARISON OF FINAL QUARTERS

If the first quarters of the years 1918, 1919 and 1920 are ignored because of the unusual January, 1920, noted, it will be of interest to compare the last nine months of the same years. It will then be found that the 1919

TABLE II—PASSENGERS CARRIED, NELSON (B. C.) MUNICIPAL RAILWAY

	1914	1915	1916	1917	1918	1919	1920
January.....		16,285	18,409	23,872	24,096	23,130	33,734
February.....	20,932	14,964	18,114	21,312	21,649	22,778	29,552
March.....	24,827	15,892	19,817	23,524	24,785	25,629	28,904
April.....	25,552	17,605	19,523	21,581	22,650	25,347	31,685
May.....	26,333	16,809	19,271	23,207	23,553	25,485	31,075
June.....	24,958	18,873	22,839	14,687	25,369	32,022	35,089
July.....	34,634	22,207	26,334	30,368	36,589	43,358	51,096
August.....	31,933	12,945	30,125	30,541	28,690	41,969	49,602
September.....	23,087	20,721	24,877	25,452	27,669	33,662	39,542
October.....	*	*	*	*	22,728	26,907	32,389
November.....	*	*	*	*	17,673	29,021	32,951
December....	*	*	*	*	24,065	35,531	37,574

Total..... 299,516 364,839 433,193

* Information not available.

RATES OF FARE

Eight tickets for 25 cents and 5 cents cash, 1910-15.

Six tickets for 25 cents and 5 cents cash, 1916-17.

Five cents cash, 1918 to April, 1920.

Twenty-five tickets for \$1, and 5 cents cash from April, 1920.

Five cents cash January, 1921.

period showed a gain over 1918 of 28 per cent in traffic (293,302, against 228,986) and of 10.6 per cent in revenue (\$14,668.16, against \$11,449.31). Also a comparison of the last nine months of 1920 with the same period of 1919 shows that the traffic continued to rise, namely, from 293,302 to 341,003, or 16 per cent, and that revenue also continued to rise, namely, from \$14,668.16 to \$15,616.85, despite the fact that 50 per cent of the passengers were paying 4 cents.

Obviously, nothing is harder than to draw hard and fast conclusions in a period of changing business conditions. Nevertheless, it does seem from the following Table III that the change to a 4-cent ticket rate resulted in a stimulation of traffic:

TABLE III—RAILWAY EARNINGS, NELSON (B. C.) MUNICIPAL RAILWAY

	1916	1917	1918	1919	1920	1921
January.....	\$920.45	\$1,193.60	\$1,204.80	\$1,105.45	\$1,674.50	\$1,512.35
February.....	905.70	1,065.60	1,082.45	1,169.15	1,464.45	.....
March.....	990.85	1,176.20	1,239.25	1,268.00	1,429.90	.....
April.....	976.15	1,079.05	1,132.50	1,260.40	1,676.50	.....
May.....	963.55	1,160.35	1,177.65	1,274.25	1,377.40	.....
June.....	1,141.95	734.35	1,268.45	1,601.10	1,618.40	.....
July.....	1,316.70	1,518.40	1,829.45	2,167.91	2,371.00	.....
August.....	1,506.25	1,627.05	1,434.51	2,098.45	2,248.95	.....
September.....	1,243.85	1,272.60	1,383.45	1,683.10	1,786.40	.....
October.....	*	*	1,136.40	1,345.35	1,430.75	.....
November.....	*	*	883.65	1,451.05	1,463.50	.....
December....	*	*	1,203.25	1,776.55	1,643.95	.....

Total..... \$14,975.81 \$18,200.76 \$20,185.70

* Information not available.

In connection with the decline in rate of increase, it is worth noting that January, 1921, at the full 5-cent rate shows an absolute loss of approximately 3,487 passengers (33,734 passengers in January, 1920, against 30,247 in January, 1921), although it would not be fair to ascribe all the loss to the change in rate of fare.

AN EFFICIENT TOWN MOTHER IS MRS. FOSTER

During the period that reduced fares were in vogue Alderman Foster was also responsible for an up-to-the-minute improvement in the pavilion at Lakeside Park, namely, the provision of electric plates, kettles and hot water for picnic parties. An old-fashioned flower gar-

den was also added to help riding, but riding continued to increase even after the close of the park season.

In conclusion, it may be mentioned that Mrs. Foster's interest in street railways was not confined to the traffic or sales department. As a delegate of an organization convening at Ottawa she visited the Ottawa Car Company's plant to get the latest facts concerning one-man car operation, and one of her committee recommendations was "that a weed killer be used on the street railway, and, as the weed killer is poisonous, that the owners of animals in the city be warned not to pasture their animals on the streets." The reference to the use of highways for a grazing common indicates that Nelson is not exactly a crowded community!

Fares and Short-Haul Traffic

Graphical Study of Short-Haul Traffic Under Varied Combinations of Headways and Rates of Fare, Which Have Marked Effect on Gross Revenue of Railway Companies

BY EDWARD A. ROBERTS

Engineer with John A. Beeler, New York, N. Y.

IT IS generally recognized that the rate of fare charged by a city street railway and the headway of service have a marked effect on that part of the company's gross revenue that is received from short-haul riders. The experience of virtually all companies which have raised their fares is that some of the short-haul passengers become pedestrians with each increment of fare, for which an allowance must be made in predicting the revenue that will be received from higher rates of fare. It is the purpose of this article to outline a simple process for indicating the effect of increases in fare on the gross revenue received from short-haul riders under varying conditions.

The first principle to take into account is the value of the short-haul rider's time. He will make a trip on a conveyance only when by so doing he saves enough time to compensate for the fare paid. If he cannot do this, he will walk or at least fail to patronize the street cars. To illustrate, if a man's time is considered as being worth 50 cents an hour, and the street car fare is 7 cents, this man in using the cars must save 7 cents' worth of time, which would be 8.4 minutes over the time required for walking.

The accompanying charts have been prepared to show the gross revenue receivable from each 100 persons who would use the street cars for rides up to 3 miles in length if it resulted in a saving of time sufficient to compensate for the fare charged. Three rates of fare, 5, 7 and 10 cents, four different car headways, two and one-half, five, ten and fifteen minutes, and two values of the car rider's time, 25 and 50 cents per hour are assumed.

The case of 100 persons desiring to take a street car ride of 2½ miles on a line with a ten-minute headway will first be taken and the value of these people's time will be assumed at 25 cents per hour, and that they are capable of walking at the army rate of speed, 5 ft. per second. The average speed of the street cars will be considered as 10 m.p.h. To walk the 2½ miles will take 39.6 minutes, while to ride will require 13½ minutes, so that the person who can board a car without waiting will save 26.1 minutes, while the person who has to wait the whole headway, ten minutes, will save 16.1 minutes.

On a 5-cent fare basis the price paid for the ride is

equivalent in value to twelve minutes of the passenger's time. In this case the entire 100 people should be attracted to the street car service because of the time saving. With a 7-cent fare and a ten-minute headway, 16.8 minutes must be saved to compensate for the price of a ride. The man who can board a car immediately can afford to ride, but he who just misses one will be 0.7 minute or forty-two seconds better off by walking. If the 100 people are assumed as arriving at the stopping place at regular intervals, say six seconds apart, just seven of them will arrive during the forty-two seconds following the departure of a car, and consequently will fail to save time by riding on the street car. The remaining ninety-three will profit so far as time is concerned by riding, and at 7 cents each will yield \$6.51. With a 10-cent fare, twenty-four minutes is required to offset the expense of riding. Direct connection will save 2.1 minutes over the walking time, but the man who has to wait ten minutes for a car would be much better off by walking. Only 21 per cent of the people

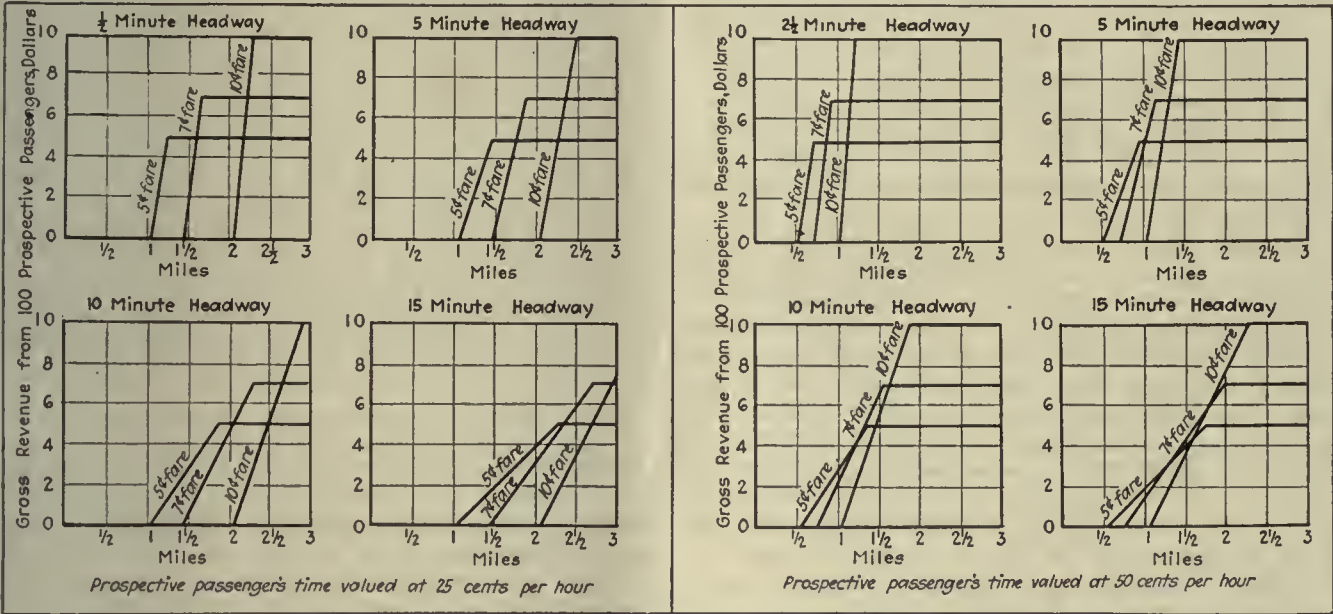
total revenue resulting from increased fares is in many cases less than that received with a lower fare.

WHAT IS VALUE OF PERSONAL DEAD TIME

It should be noted that the minimum length of trip which a person is justified in taking on a street car does not vary with changes in headway, but depends only upon the rate of fare and the value of the person's time. The data indicated by the charts on this feature are as follows:

	Minimum Justifiable Ride-Miles		
	5-Cent Fare	7-Cent Fare	10-Cent Fare
Prospect's time at 25 cents per hour...	1.03	1.45	2.07
Prospect's time at 50 cents per hour...	.52	.72	1.03

Objection to the method used might be based on the rather far-fetched assumption that each probable rider arriving at a street car stopping place has to know exactly when the next car is due and that he has to go through some sort of a calculation to determine whether



DIAGRAMS SHOWING COMPETITIVE WALKING DISTANCES FOR VARIOUS HEADWAYS WHEN BASE FARES ARE FIXED AT 5, 7 OR 10 CENTS AND TIME IS VALUED AT 25 OR 50 CENTS PER HOUR

will in this case find it a satisfactory financial transaction to pay the 10-cent fare.

The point at which a sloping line in the charts starts upward indicates the minimum ride which a person is justified in taking provided he just connects with a car, which would be of course regardless of the frequency of service. The top point of the sloping line shows the minimum ride the person who waits the full interval between cars is warranted in taking. Stated in other words, the top point indicates the maximum distance a person who just misses a car would be justified in walking. The slope of the line bears a direct relation to the headway and is a measure of the doubtful zone in which a person might either walk or ride. The more frequent the service, the shorter should be the walking radius of possible riders.

The accompanying charts have been obtained by following out this process in detail for a number of different cases. The charts show that on the shorter trips the lowest fare yields the most revenue and they illustrate the bad effect of higher fares on short-haul traffic. They further give a definite indication of the relative values of increased rates and show that the

he will walk or will wait for a car. This, of course, is not done in detail under actual conditions, but it is a fact that the average person going but a short distance does often make a hasty survey, by looking up and down the street, to determine whether a car is approaching or has just left. This survey causes him either to walk or to ride. Most persons also either consciously or unconsciously put a fairly definite value on their time, and in deciding whether to spend money to save time they are swayed by the personal monetary value of time saved. Furthermore, the person who habitually makes the same short trip realizes very quickly whether the street cars always save him enough time to warrant their continued use. It is believed therefore that the method used for determining the proportion of possible riders that will be customers approximates fairly closely the actual conditions. This method of comparing results to be expected under different rates of fare also provides a good forecast.

The placing of a definite value on the average car rider's time is not at all a simple task, and one person's estimate is about as good as another's. A person's earning ability should, however, not be confused with

Steel Rails*

Expert Outlines Present Status of Rail Making and Raises Questions as to the Problems Which Have Been Suggested by Extensive Experience in Conducting Special Inspections

BY C. W. GENNET, JR.

Of Robert W. Hunt & Company, Engineers, Chicago, Ill.

THE first T-rail ever made in America was rolled at Danville, Pa., in 1845. Twenty years later the first bessemer steel rails were rolled at the North Chicago mill. It was just as difficult in the early days to obtain satisfactory rails as it is today.

It is estimated that a production of 4,500,000 tons of rail per year for the next five years is necessary in order to put the railroads in proper physical condition and to overcome deferred maintenance caused by the war. There will be difficulty in obtaining any such quantities, owing to the fact that many rail mills have been turned over to the production of other forms of steel.

No doubt rails wear rapidly in various places of heavy traffic and have to be quickly replaced, but, on the whole, there is little question that the general adoption of open-hearth steel has gone a long way toward satisfactorily solving problems of wear that were so frequently raised with bessemer rails. The question of safe rails is now much more important than whether rails will give a year or two more service.

Ordinary figures for failures are not particularly impressive except to the technician. But interpreting published records in a certain way indicates that for open-hearth steel one rail out of every eight hundred laid may be expected to fail and has to be replaced in the first five years of service. Only about half of the total failures are what may be termed of a dangerous type. The others mostly consist of defects occurring in the head of rails, which as a rule can be easily detected by careful surveillance and removed prior to the development of further trouble. Notwithstanding what the types of failures may be, or how prolific they may be, questions of specifications and manufacture are important and deserving of the fullest thought.

UNIFICATION OF RAIL SPECIFICATIONS IS DESIRABLE

There is little use in threshing over the subject of specifications, except in a very general way. The matter is in the competent hands on the one side of the American Railway Engineering Association's rail committee, while on the other side are the manufacturers. The regrettable fact seems to be that the two sides cannot compose their differences, as by arbitration for example, and enable a single specification to be promulgated for general use by all the roads. My criticism of most rail specifications is that they are too broad in certain features and too narrow in certain others, with the result that both manufacturers and consumers suffer aggravating incidents that could easily be prevented. Manufacturers frequently find it difficult to get good steel quickly accepted, and on the contrary railroads are frequently bound to accept what unquestionably ought to be rejected outright.

To illustrate the point, consider for a moment 99-lb. rails for which there are at least four specifications in common use having their low limits of carbon varying by the small difference of four points. If a mill

rolling for one customer whose low limit of carbon is 0.63 per cent happens to get a heat showing 0.62 per cent carbon but satisfactory in all other respects, the slight difference of one point of carbon in the specification makes it necessary for the rails, or perhaps the ingots, to be diverted from the original to some other customer. That possibly means allowing the ingots to get cold, later to be reheated and rolled—a performance almost bound to result in inferior practice both in the mill and later on the track. The matter of a few points of carbon, and possibly some other elements, has repeatedly been proved to be quite insignificant in the long run and easily overshadowed by the kind of treatment accorded the steel in the mill. Determination of what constitutes a reasonable minimum limit for carbon, and insistence on such as a standard, the same as 0.04 per cent has been fixed for years as a maximum for phosphorus, would be a great step forward in harmonizing specifications without serious detriment to the users.

Again, specifications lack breadth in the customary clause governing straightening. No doubt the specifications used in 1844 read the same as they do now, namely, that "rails must be straight in line and surface." The result of this requirement is that rails may be strained beyond their elastic limit in twenty or more places by repeated blows in the cold-straightening press, only then to be shipped to a 5- or 6-deg. curve and readily spiked into place. Modern section rails are exceedingly flexible and, providing they contain no short bends or sharp kinks, it would seem practicable to accept them within certain limits perhaps, without the damaging cold straightening now given to each and every rail. Experimental lots of such rails have given fair service and the subject deserves more attention.

THE ITEM OF TESTING IN RAIL SPECIFICATIONS

Most rail specifications are too broad with respect to the testing, both chemically and physically. The chemical composition is invariably obtained by analyzing drillings taken from a small test ingot weighing a couple of pounds and cast while the regular ingots are being poured. There is no prescribed size or shape for the test ingots used by the different mills, nor restriction on whether they shall be cast from the first, middle or last part of a heat. In fact, no restrictions prevail of any moment whatsoever, pertaining either to the test ingots, *per se*, or to the chemical practice that may be later followed in doing the analytical work. The result is that the actual chemical composition reported by the mills for their steel may vary decidedly as between different mills, so that a 65 carbon heat in Colorado may be quite different from a 65 carbon heat in Alabama or Pennsylvania. It should be said in justice that this subject is being investigated and early action is hoped for.

The physical tests do not, as a rule, go far enough to protect against bad or unsound rails being accepted and laid in the tracks, only to be replaced perhaps after a short service. Testing two or three pieces of rails to represent as many as two hundred made from perhaps fifty ingots, each possessing marked individuality, even though from the same heat, is incompatible with the tests prescribed for many other products on whose use hinges no important question of life. A requirement for oil line pipe is that each and every length, in addition to passing a careful surface inspection on both the inside and the outside, shall withstand a prescribed

* Abstract of paper read before the Western Society of Engineers, Chicago, Ill.

pressure test. Each piece of cast-iron water pipe, whose walls may be an inch thick, must likewise be tested and inspected. And a most odious comparison with the tests on rails is afforded by a recently adopted specification for wrought-iron tie plates, which requires a complete tensile test to be made on one out of every thousand plates, a proportion by weight which if applied to rails would mean something like sixteen tensile tests per heat. The proposed abandonment of the drop test, for years recognized as a standard test for brittleness, and the plan of covering this feature by resort to a measurement for ductility obtained under difficult and uncertain conditions, is regrettable. Granting the importance of ductility for rail steel, the imposition of arbitrarily determined limits for it, the matter of measuring it satisfactorily except in the laboratory, and finally the question of accepting or rejecting rails whose ductility varies by a hundredth part of an inch, is, to my way of thinking, positively dangerous. Would it not be better to waive the question of the ductility of rails entirely, as it was so long an unknown thing, and to devote more study to the definition of "interior defects" and such positive methods for detecting them as would permit of rejecting those rails whose test piece fractures show unmistakable signs of segregation?

The manufacture of basic open-hearth steel rails of modern sections is a process fraught with many questions of practice very different from that followed in the bessemer methods of a few years back. The introduction of large furnaces from which a hundred tons of steel is tapped for a single heat, the casting of as many as fifty ingots on a heat, the use of large heavy ingots, and last, but not least, the fact that modern rail steel is sufficiently high in carbon to be easily susceptible to heat treatment, are features so influencing the general process as to make constant attention necessary to matters that in the old days were scarcely present at all. My observations of manufacturing conditions, resulting from the closest of contact with the special inspection of rails at all of the different mills, convince me that many of these often neglected matters are paramount to other details so frequently brought to the front, as, for instance, a few points of carbon. And in this connection permit me to say that special inspection has not only revealed many important incidents that no mill superintendent will condone when his attention is called to them, but it has also afforded opportunity for tracing the history of bad rails in service back to some slighted detail of manufacture no doubt responsible for the failures.

SOME PERTINENT QUESTIONS ON STEEL MANUFACTURE

I regard the manufacture and rolling of rail steel as of more importance than that of any other steel product, and conditions emphasize the necessity of making thorough studies of the various features of present-day methods. Such studies must frequently be based not only on the manufacture itself but on the story that the rails in service may later tell. Records for many subjects are already in hand and time and work are merely required to afford definite information on questions of great value to both railroads and manufacturers. Literature is very weak on many of the subjects that ought to be investigated and discussed. And among the many questions that can be raised I suggest some of the following, pertinent of modern practice and especially appropriate, therefore, for original research and study:

1. Are rails made of steel by the continuous Talbot fur-

nace process comparable with those made by the straight open-hearth method? In the continuous process the furnace is seldom emptied, but a hundred tons or so of steel is tapped every two hours, as against the ten hours of time required to make an equivalent heat in a regular furnace. Is the steel from the rapid working Talbot furnace sufficiently free from oxides and other impurities to afford good, sound rails, and how can such a matter be quickly proved?

2. What effect, if any, on rails has steel made by the Duplex process, wherein highly oxidized metal is added to the open-hearth furnace, sometimes very soon before tapping? How can rails rolled from steel containing excessive amounts of impurities be detected?

3. What effect on rails is produced by recarbonizing the steel in the ladle with coal or coke and then adding cold deoxidizers to the ladle? What is the real effect produced by holding a ladle of steel prior to casting the ingots to permit of time for the chemical reactions to settle?

4. What is the effect on rails rolled from ingots cast with running stoppers and sometimes without any control by the ladle operator? How does the size of the nozzle, pouring temperatures and time required to cast the ingots of a heat influence rails?

5. How soon after casting ingots should they be charged into the soaking pits in order to assure a minimum of piping and segregation? What effects are produced by delays in promptly charging the ingots to the pits, and what is the effect of unduly and rapidly chilling the outside or skin of the ingots?

6. How long a time and under what conditions of gas and air regulation should ingots remain in the soaking pits? What kind of control of the pits is best to insure against overheating or burning the ingots? What is the effect of rolling rails from ingots one side of which has been heated so hot as to show a bright white spot significant of overheating?

7. What effect on rails have different rates of blooming the ingots? In some cases 8-in. x 8-in. blooms are made from ingots in nine passes and in other cases in twenty passes. Some mills work rapidly and others slowly; does this produce any difference?

8. What effect on the grain structure or the life of rails is produced by increasing the number of passes, or work given to the steel, when the ingots are rolled into rail? One mill makes a rail from an ingot 19 in. square in fifteen passes, while another mill makes the same rail from an ingot 24 in. square in twenty-nine passes. Has the average rate of reduction per pass any effect on the life of rails?

9. What matters mostly influence the production of rails showing seams on the surface? Some heats are practically free from indications of seams, while on other heats rolled at the same time seams are abundant.

Signal Tail-Lights for Safety Cars



SAFETY CAR EQUIPPED WITH INDICATING SIGNALS

RED and green tail lights which are alternately automatically cut in, red to indicate power off and green to show power on to the following car, truck or automobile, are being installed on all of the safety cars in Terre Haute, Ind. Seventeen cars have been equipped at the time of this writing and the remaining forty-three cars are being equipped at the rate of four or five a month as they come into the shop for regular overhauling. This signal arrangement was described in the *ELECTRIC RAILWAY JOURNAL* for Aug.

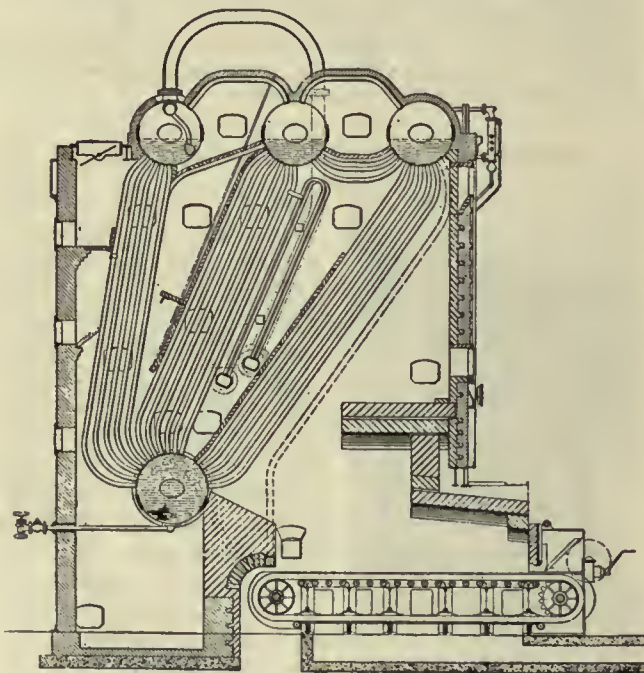
3, 1918, in connection with its use on cars of the Philadelphia Rapid Transit Company for service to the Hog Island shipyard and on cars of the Cleveland (Ohio) Railway. As the Cleveland cars are single-ended the signal lights are carried at the center of the dash.

Stirling Boiler Improved

Recent Modifications Which Have Been Made in the Design Make for Standardization, Greater Accessibility and More Convenient Setting

SEVERAL changes have been made during the last few years in the design of the Stirling boiler by the manufacturers, the Babcock & Wilcox Company. A side view of the latest type, equipped with a superheater and a chain grate stoker, is shown in the accompanying engraving. Briefly, the changes from the original type can be grouped under seven heads:

1. All steam drums are now placed on the same level, the steam being taken from the rear steam drum. The primary purpose of this is to reduce priming with concentrated water.
2. Protection of the rear steam drum is given by a baffle carried on the front tube of the rear bank, this tube being expanded into the center drum.
3. The arrangement of the tubes circumferentially on the mud drum is such as to give a larger superheater chamber than before. This permits a greater amount of superheating surface for higher superheat than hitherto has been obtainable and also greater ease of access to the superheater headers and handhole caps.
4. In stoker-fired work, except in the case of stokers of a design that permits of carrying the front boiler wall, this wall is carried on supporting members furnished as part of the standard boiler equipment. Where this front wall is so carried a slip joint between the front boiler wall and that portion of the wall carried on the stoker is used. These features not only definitely fix the responsibility of carrying the front boiler wall but give a front wall construction that may be repaired without taking down the entire wall.
5. Where the size of the boiler wall is such as to make



SECTION THROUGH ONE OF THE NEW CLASSES OF STIRLING BOILERS

it advisable the use of bonding tile with properly designed supporting members is standard construction in the front wall. This construction, as proved in operation, is successful in overcoming the tendency of the front wall to spring inward.

6. In the earlier designs, where battery settings were installed, a three-legged center support was standard in the battery wall. In the redesigned boiler the center support has but two vertical members, doing away with this objection.

7. In battery settings special means of access for inspection of the inside mud drum heads is standard in the redesigned boiler.

The studies that have led to the redesigning of the Stirling boiler naturally led to a consideration of the variation between classes and sizes of boilers. This has resulted in an entirely new classification in which the variation between the classes and sizes is simple, logical and progressive. While the purchaser of steam boilers is not primarily interested in methods of manufacture provided proper construction methods are followed, it is, however, the purchaser who ultimately receives the benefit of any improvements in manufacturing methods.

This reclassification will undoubtedly lead to a reduction in manufacturing cost through a reduction in inventory of material that must be carried in the number of standards in use, etc. While the manufacturer of this boiler will offer previous standards to complete plants in which such standards were installed, it is the intention to offer the redesigned and reclassified boilers for all new work.

A. S. M. E. Papers on Boiler Operation and Boiler-Water Analyses

THE results of a series of eleven tests made on a 468-hp. Edgemoor boiler fired with pulverized coal, at the Oneida Street Station of the Milwaukee Electric Railway & Light Company, reveal that the customary specification of pulverizing coal to the extreme fineness of 85 per cent through a 200-mesh screen is an unnecessary precaution. These tests, conducted by Henry Kreisinger, research engineer Combustion Engineering Corporation, and John Blizard, fuel engineer United States Bureau of Mines, and the results of which are printed in the May issue of *Mechanical Engineering*, published by the American Society of Mechanical Engineers, indicate also that completeness of combustion is more a matter of a proper furnace and burner design and of the right way of supplying air rather than of the fineness of the coal. It was also found that undried coal could be burned as successfully as fuel dried to 1 per cent moisture, the only difference being a slight decrease in efficiency which checked closely with the increase in losses due to evaporating the increased moisture in the coal. The best results were obtained when the coal was burned at a rate of 1 to 1.5 lb. per cu.ft. of combustion space per hour.

In considering the corrosive effects of boiler feed water, J. R. McDermet, research engineer the Elliott Company, in an article in the same publication states that boilers operating below rating rarely suffer any damage from corrosion from oxygen whatever its content in the feed water. Regardless of the forcing, however, if the concentration of oxygen be kept below one part per thousand by volume pitting action is seldom experienced.

The corrosion of cast iron, in its initial stages, is more rapid than that of steel, but the adhering residue immediately forms a protective coating which arrests further action. Cast-iron economizer corrosion is due to the continuous removal of this protective coating.

New Locomotive for Monongahela Valley Traction Company

THE Monongahela Valley Traction Company has recently purchased a new 50-ton class B Baldwin-Westinghouse locomotive, which is a duplicate of locomotive No. 2,000, installed about two years ago. The new locomotive has just been placed in service.

The locomotive is equipped with four type 562-D-5, 100-hp., 600-volt, field-control motors and double-end



MONONGAHELA VALLEY 50-TON LOCOMOTIVE
JUST PLACED IN SERVICE

HL control. It will be used for general utility haulage, as this company does extensive business on a steam-railroad basis of operation. An important part of the business is the movement of gasoline tank cars from Jackson's mill on the Clarksburg Weston lines to the freight interchange of the Baltimore & Ohio Railroad near Clarksburg.

The general characteristics of this locomotive are as follows:

Weight	50 tons
Maximum tractive effort at 25 per cent adhesion..	25,000 lb.
Normal tractive effort at 9.7 m.p.h., full field, one hour	15,200 lb.
Continuous tractive effort with forced ventilation, short field	9,000 lb.
Maximum trailing load starting on $\frac{1}{2}$ per cent grade, Balancing speed, short field, at 600 volts on level with 500-ton trailing load.....	860 tons
Balancing speed, short field, at 600 volts on 3.0 per cent grade with 200-ton trailing load.....	17.5 m.p.h.
	10.5 m.p.h.

The locomotive will also be used in conjunction with locomotive No. 2,000 in hauling coal to the Domestic Coke Company plant at South Fairmont, as well as for hauling carloads of slag for ballast work along the railway company's tracks. Freight business on this property has increased considerably, both in carload and less-than-carload movement, the latter being handled on a package-freight basis.

The Spray Gun for Painting

THE firm of W. N. Matthews & Brothers, St. Louis, Mo., is now marketing the Matthews automatic spray gun for painting. This spray gun is furnished in two types, one designed for general painting purposes in industrial and manufacturing plants when quantity production is essential, and for painting large areas, general house painting, etc. With this type of gun the container holding the paint is suspended above the surface being painted and the paint flows to the

gun through a hose. The feature of this spray gun is that the air and paint are mixed at the point of the nozzle and not inside the gun. The other type is the jar type, which is especially adapted for use in plants where frequent changes in paint are required. This gun is designed so that the paint is held in a small container which is screwed to the under side of the valve.

Either of these models can be adjusted to produce either a narrow line or to throw a spray of sufficient volume to cover 80 sq.ft. per minute. The air pressure necessary varies from 10 to 80 lb. per square inch, depending upon the character of the paint being used.

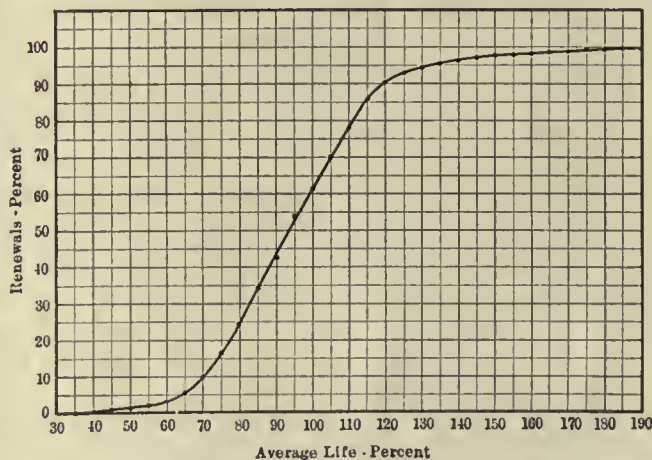
Tie Renewals in Relation to Average Life

RECORDS kept by the Forrest Products Laboratory, Madison, Wis., have shown that there is a general law governing the rate of renewals in all groups of railroad ties, no matter what kind of wood is used in the ties, where they are placed or whether they are untreated or treated with preservatives. These records show a wide variation in the lives of various groups of ties, but a remarkable similarity between the percentages of ties that need replacement at proportionate intervals in the lives of any two groups.

The comparisons are based on forty-three groups, including 42,000 ties of many species, some untreated and some treated. For any of these groups, the percentage of renewals in relation to the percentage of average life is fairly represented by the curve shown.

This curve answers several valuable purposes. It can be used in estimating the average life of a group of ties long before all the ties in the group have been removed, also to show the number of replacements that will be necessary during a given year.

As an example, assume that out of a group of 1,000 ties, 200, or 20 per cent, have been removed at the end of four years. From the curve it will be seen that 20 per cent of a group is usually removed at about 77 per cent of the average life. The average life of this group, then, will be 5.2 years. Further computation shows that the number of replacements to be expected during the fifth



TIE RENEWALS IN RELATION TO AVERAGE LIFE

year is about 350, the sixth year 300, the seventh 100, and that at the end of nine years practically all the ties in the group will have been removed.

Thus, with the aid of the curve, it is possible to predict the average life of any group of ties even while most of them are still in service.

American Association News

ASSOCIATION'S PUBLICITY PLAN AS OUTLINED—ENGINEERING AND OTHER ASSOCIATION REPORTS ARE BEING WHIPPED INTO FORM—EXECUTIVE COMMITTEE SELECTS ATLANTIC CITY FOR CONVENTION, WHICH WILL BE HELD IN NEW HALL ADJOINING BOARDWALK

Atlantic City Gets 1921 Convention

ONCE more Atlantic City has been chosen as the location of the annual convention of the association. The 1921 convention will be held during the week beginning Oct. 3. In view of the fact that there are to be no exhibits in connection with this year's convention arrangements have been made to hold the meetings in a new building that has only recently been completed on the Boardwalk at North Carolina Avenue immediately in front of Haddon Hall.

This building has a large convention hall, where the principal meetings will convene, and immediately adjacent thereto are smaller rooms that are to be used for the meetings of the affiliated associations.

The subjects committee has already mapped out a program for the American meetings of extraordinary interest. This will be announced at an early date. The program for the affiliated associations will consist mainly of committee reports and addresses, dealing as usual largely with railway operation. Delegates who attend the convention are urged to come prepared to avail themselves of the especial opportunity that is to be given to enter into a full discussion of the reports and papers on the floor of the meeting.

The usual arrangements have been made with the Hotel Men's Association for accommodations and those who are planning to attend should make their reservations at an early date.

Full details as to the program and other matters of interest pertaining to the convention will be published from time to time as they are completed.

Sales Taxes Uncollectible on Urban Car Fares

PHILLIP H. GADSDEN, chairman of the joint tax committee representing the American Electric Railway Association, the American Gas Association and the National Electric Light Association, in a statement before the Senate finance committee on May 10, said it would be very difficult, and almost an impossibility, to apply a sales tax on street car fares. So far as the electric and gas utilities are concerned, the same would apply where the prepay quarter meters are used. The cost of changing the 1,250,000 prepay meters in the country so as to collect a 2 per cent tax from the consumer would be \$2.50 per meter. The tax that would accrue on the basis of the average consumption of gas at \$1.50 per thousand feet would yield only 37½ cents to the government per annum. In other words, to collect the tax these utilities would have to make an investment of about as much as the government could collect in taxes in seven years.

A revision of the federal tax laws to preclude the issuance of tax exempt government securities so as to enable regulated industries to dispose of their securities was also declared vital to the utilities.

Mr. Gadsden said that public utilities did not seek to evade taxation, but merely desired better conditions under which to market their securities for the purpose of providing extensions and betterments to their properties. Since public utilities as a class are regulated as to operation and compelled to give service at fixed prices regardless of economic conditions it is only fair that they be considered as a separate class in taxation legislation. The appointment of a special subcommittee to make a thorough study of the public utility tax situation was urged.

Two features of the securities situation which were declared vital to the continued operation of public utilities are: Persons upon whom public utilities must depend very largely for new money—those subject to a surtax of over 3 per cent—no longer will buy public utility securities, because they find tax exempt 5 per cent government securities better investments.

The only persons who, under the present tax laws, find it profitable to buy public utility securities are those whose incomes are less than \$10,000 a year. Their combined savings are only \$116,000,000, or about \$1,884,000,000 less than is required by the public utilities, including steam railroads, electric railways, gas, electric light and power plants, annually to make their betterments and extensions.

The most serious question which confronts public utilities is their inability to secure the new capital required annually in competition with tax exempt municipal securities.

Under the law public utilities are limited to a return on their investment of not over 8 per cent. Unless they can pay over 8 per cent they cannot compete with exempt municipal and state securities.* The result of this situation is that inevitably these extensions and betterments cannot be made. Service will slow down and become unsatisfactory and there becomes a growing demand on the part of the public for the acquisition of these utilities by municipalities on the ground that they could borrow money at not over 5 per cent. In other words, while the political policy of this country is firmly and definitely opposed to municipal and government ownership of utilities the taxation policies of our government are forcing it whether it is wanted or not.

Unless the policy of exempting municipal securities is discontinued we are rapidly drifting into practical socialism, which in its essence means ownership of everything by the public.

What is the answer? First, follow the advice of Secretary Mellon in his recent letter to the chairman of the ways and means committee and forbid further issuance of tax exempt securities. This, however, will fail to relieve the present public utility situation. It is estimated that there are \$14,000,000 of tax exempt

*This estimate is based on a computation of interest rates, which included, among its factors, the risk involved and the effect of the Federal income taxes. Public utility capital was considered as having been raised on the usual ratio of bonds and stocks.—[Eds.]

securities now outstanding. If the public utilities are to develop as they should there must be some relief from discriminatory burdens of taxation as it affects the investor. This position must not be misunderstood. The public utility companies are not themselves asking for any relief in taxation, for they propose to pay their full measure of taxation, but they think some plan will have to be devised by which their securities can compete successfully with those already under tax exemption laws.

What Is the Association's Publicity Plan?

UNDER date of May 5 President Gadsden addressed a letter to all member companies, asking for contributions to support the publicity work being carried on at the association's headquarters under the direction of the committee of publicity. In his letter he states that the audit of the books of the association has progressed far enough to make it clear that a special assessment will not be necessary, for the obligations of the association can be met out of current receipts without its work being curtailed. Since the defalcation was discovered publicity work has proceeded along the lines laid down by the Committee of One Hundred and the results to date more than justify the belief of the publicity committee that much good can be accomplished by its plan. Continuing, he said that at his request the publicity plan of the Committee of One Hundred for future work and any action looking toward financial contribution to carry on this publicity had been deferred until it was determined whether it would be necessary to call upon the membership to make up deficits accruing on account of the recent defalcation.

Now that such an assessment is not necessary, the committee proposes to carry out its original plan. President Gadsden believes that the great importance of carrying on the proper sort of publicity is realized and therefore urgently requests that all members give the program their closest attention and co-operation.

WHAT THE PLAN IS

With a view to obtaining a better public understanding of electric railway problems, the Committee of One Hundred, co-operating with the publicity committee of the American Electric Railway Association, opened on Jan. 1, 1921, an advertising section in the association offices, New York.

The functions of the advertising section are: To offer free suggestion, advice and counsel to electric railway companies on their advertising and publicity problems; to prepare for local distribution, car cards, leaflets, booklets, newspaper advertisements and other advertising material; to prepare bulletins on the electric railway situation for the use of public speakers, for distribution by bond houses, investment bankers and other institutions engaged in the sale of electric railway securities, and for utility managers to use as good will promoters; to issue to the press statements, news stories, speeches and articles of interest regarding the industry; to co-operate with state and national public utility information committees; to act as a general clearing house between electric railway companies for the dissemination of advertising and publicity material; to make engagements for widely known speakers before national conventions and other large gatherings for the discussion of electric railway problems, and to co-operate with these speakers in seeing that they obtain correct facts upon which to base their addresses and that

their remarks receive proper distribution; to study the motion picture field in an effort to adapt it to use as an electric railway advertising medium.

RESULTS TO DATE

Since the advertising section has been opened more than a million copies of leaflets containing constructive facts calculated to inspire fairer treatment of electric railways have been distributed through local companies.

Co-operation has also been manifest with newspapers, for hundreds of columns of news material have been printed. Among the items covered have been the condition of the electric railways nationally; the financial needs of public utilities; financing and refinancing of electric railways; wage reductions.

The section has also prepared and distributed to the member companies a summary of references to electric railway legislation suggested by the Governors in their annual legislative messages and car cards summarizing the findings and recommendations of the Federal Electric Railways Commission.

It planned and helped to carry out National Electric Railway Day, May 4, 1921, which resulted in driving home through parades, motion pictures, display advertising and newspaper stories, varying in length from 600 words to a column and a half, the lesson of increased efficiency of electric railways and low charges for service.

In addition the section has through its chief, Labert St. Clair, aided by advice and suggestion many local companies in making special campaigns.

MATERIAL NOW AVAILABLE

The section now has ready for distribution two leaflets, a booklet, wall cards, etc. A textbook on electric railway advertising is in preparation and will be sent out as soon as it is off the press. This book tells how to advertise electric railways through every known channel. It discusses in understandable language newspaper advertising and publicity, car cards, leaflets, letters, company sections, public meetings and the many other mediums through which electric railways can sell their service to the public.

Pending the financing of the activities of the advertising section there has been a nominal charge for certain of the leaflets enumerated above, but when the financing plan is completed all the literature as well as service will be supplied gratis.

Committee on Safety Holds Final Meeting

ON MAY 10 the Joint T. & T. and Claims Association Committee on Safety held its final meeting at association headquarters and approved a tentative draft of the report which is to be presented at the annual convention.

Those present were E. C. Spring, Lehigh Valley Transit Company, and R. E. McDougall, New York & Harlem Railroad, co-chairmen; H. O. Allison, Beaver Valley Traction Company, proxy for W. H. Boyce; A. J. Van Brunt, Public Service Railway, proxy for H. V. Drown; E. M. Walker, Terre Haute Traction & Light Company; W. F. Weh, Cleveland Railway, and L. H. Palmer, United Railways & Electric Company of Baltimore, sponsor for the committee.

The report speaks of the necessity of some concerted action in public safety work not alone by the street railways but in co-operation with other civic bodies

and local industries affected by the dangers existing in the communities.

The committee has mapped out a plan of co-operation whereby it is hoped effective results can be obtained to decrease the volume of accidents. That there is need of such an effort is reflected in the analysis of the replies to the questionnaire sent out by the committee.

Large Attendance at Equipment Committee Meeting

THE equipment committee of the Engineering Association held a two-day meeting at association headquarters in New York City on May 4 and 5. The several sub-committees discussed their particular subjects on the first day and formulated recommendations which were made to the entire committee which assembled on the second day. Those present were Daniel Durie, West Penn Railways, chairman; W. S. Adams, the J. G. Brill Company; H. A. Benedict, Public Service Railway of New Jersey; R. H. Dalgleish, Capital Traction Company; James C. C. Holding, Midvale Steel & Ordnance Company; H. A. Johnson, Metropolitan West Side Elevated Railway; T. R. Langan, Westinghouse Electric & Manufacturing Company; F. H. Miller, Louisville Railway; E. D. Priest, General Electric Company; F. W. Sargent, American Brake Shoe & Foundry Company; C. F. Scott, General Electric Company; Karl A. Simmon, Westinghouse Electric & Manufacturing Company, and C. W. Squier, ELECTRIC RAILWAY JOURNAL. In addition to the regular members of the equipment committee, R. W. Steigerwalt represented C. F. W. Rys of the Carnegie Steel Company, and W. H. Phillips, R. D. Nuttall Company, and N. B. Trist, Carnegie Steel Company, were present at the invitation of the committee to assist in developing standards which the committee is considering.

Proposed additional standards for brake shoes, brake-shoe heads and brake-shoe keys were discussed at considerable length, and it was the general opinion that all dimensions except the radius for the face contour could be properly standardized at this time, this radius to be specified by the customers to suit the diameter of wheel used. The tread and flange contours as presented by last year's equipment committee appeared to be satisfactory, and this year's committee considers it inadvisable at this time to add to the list, as it thought the present number should take care of all requirements.

In regard to a standard wheel contour for cast-iron wheels, the committee felt that a progress report was all that could be presented this year as the thickness in flanges of cast-iron wheels differ to such an extent from steel wheels that it would necessitate changing other standards which had already been adopted. The proposed specification for carbon-steel wheels was discussed and changes were recommended which will bring this into agreement with that of the American Society for Testing Materials.

The sub-committee on car arrangement and design presented a very exhaustive written report for consideration. This is to be reviewed by various members before next meeting and reported on with any additional suggestions or comments.

The sub-committee on life of wearing parts has obtained satisfactory information from fourteen properties, and additional information is expected from six others. The equipment committee expects to include in its final report comments on shop practices and methods

which would aid in increasing the life of wearing parts as it is felt that greater publicity in regard to this matter is desirable.

The sub-committee on direct-current lightning arresters reported that a questionnaire had been sent out to 225 properties and so far replies have been received from but thirty-five. From the replies received it develops that lightning conditions appear to be the most severe along the Ohio and Mississippi Valleys.

Specifications for gears and pinions were discussed and it appears that the present association specifications can be brought into agreement with that proposed by the American Gear Manufacturers' Association without much difficulty, and an effort will be made to accomplish this. A revision of the specification for heat-treated axles and similar forgings is not to be attempted this year.

A report was presented showing the results of a test on wheels in service with a curved contour, and it appeared from present results that this type of contour tends to produce excessive wear on the flanges and is not desirable. A general outline was given of the report which is to be presented on the design of a typical shop building. Various suggestions were made for additions, and it is evident that this report will be very complete.

Reports on Power Blocked Out

AT THE meeting of the Engineering Association committee on power generation, held in New York City on May 11, reports of sub-committees were discussed. Of the four topics assigned the following dispositions were made: A form of contract for purchase of power, progress report only; comparative costs of steam produced from different fuels, the preparation of a non-statistical summary of the factors involved was approved for inclusion in the report; progress on the super-power plan outlined by W. S. Murray at the 1920 convention, to be covered in a digest of the forthcoming government report, with suggestions regarding relation to electric railways; on multiple-unit automatic substation, a lengthy illustrated paper was tentatively approved for inclusion in the report.

The meeting was attended by A. B. Stitzer, New York City, chairman; L. D. Bale, Cleveland, Ohio; H. E. Davis, Utica, N. Y.; G. W. Saathoff, New York City; L. R. Shattuck, New York City, and H. B. Reynolds, New York City.

The container idea in transportation is making considerable headway in the steam railroad field. One of the latest developments is that which is taking place on the New York Central Railroad, which has experimented with the plan on a considerable scale and is now having manufactured a number of container equipments. The New York Central's "express" type of car for this service is 55 ft. long, so fitted that it can be incorporated in a standard passenger train. It carries nine steel containers, 9 ft. wide by 6 ft. long, with an inside clear height of 7 ft. 4 in., and a door 3 ft. x 6 ft. They are made as nearly burglar and fire proof as possible, are weather-tight and have a carrying capacity up to 3 tons each. They have wood floors and special attachments for convenient lifting and handling. The freight-train type is provided with containers of two sizes, 14 ft. and 7 ft. long, respectively, so that two large and two small of the removable sections fit on a 50-ft. freight car.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Detroit Strike Averted

Amalgamated Officials Place the Wage Issue Squarely Before Men in That City

After a period of bickering lasting since last December, platform employees of the Detroit (Mich.) United Railway in Detroit voted on May 6 to adopt the Cleveland plan of wages offered by the Detroit United Railway which was rejected almost unanimously a week previous when a strike was voted. A new agreement to be enforced for one year will be arranged for between representatives of the men and company officials.

Besides the reduction to the new scale of 55 cents, 58 cents and 60 cents for Detroit city employees and to a new scale of 53 cents, 56 cents and 58 cents for employees in other southern Michigan cities, the terms of the new agreement vary from the old one regarding overtime. Under the new agreement time and one-quarter will be allowed for time over eight hours with time and one-half for overtime on Sundays and holidays. Under the former agreement time and one-half was paid for all overtime.

FORMER DECISION REVERSED

The strike, which was first voted by the men to be effective on May 1, was postponed for one week when President Mahon made a seven-day agreement with the company with a view of again submitting the matter to the men. The president considered the proposed strike suicidal at the present time and a sacrifice of the union.

The vote followed a final mass meeting of the men employed on the Detroit city lines, held Wednesday evening, when the union leaders summed up the situation and without recommendations put the matter squarely up to the men to decide whether or not the proposed cut in pay would be accepted or a strike called. The further mass meetings had been called by representatives of the men because it was believed that the men had not clearly understood the situation when they voted to strike in case the company would not renew the existing agreement as in force for the last year.

The outlining of the industrial situation throughout the country by W. D. Mahon, president of the Amalgamated Association, and the presentation of facts concerning wage reductions in other cities, are reported to have had considerable influence with the men in bringing about the final result.

Many of the employees changed their attitude regarding the proposed wage reduction when it was announced by the

municipal street railway commission that the same wage scale as proposed by the Detroit United Railway or 55 cents, 58 cents and 60 cents an hour was to be put into effect on the municipal lines on May 1. The Detroit United men had counted upon having the moral support of the wage scale of 70 cents, 73 cents and 75 cents being continued on the city lines, but the announced cut on these lines was believed by both officials of the company and of the union to have been influential in averting the threatened strike.

The city employees had voted to follow the example of the Detroit United Railway employees in the event of a strike, and thus the company and the city were in the same position in the effort to reduce wages. The men also believed that the company was more thoroughly prepared for a strike than on previous instances.

The referendum was taken Friday to decide whether the men would strike, accept the 55-cent, 58-cent and 60-cent wage scale offered them by the company, or accept the 50-cent, 55-cent and 60-cent wage with the privilege of arbitrating the whole matter later.

Small Town Folk Should Study the Case of Bowling Green

Folks in small towns where the existing electric railway is fighting for its life are admonished to beware by the Savannah (Ga.) Press lest they inherit a pile of junk. The lesson which this paper draws is taken from the experience of Bowling Green, Ky. The Press said recently:

Bowling Green, Ky.! That's the place! It doesn't look big on the map. Even in the census reports, it is said to consist of only 15,000 people.

But one in every three of those 15,000 owns an automobile. Nice little town. What?

Every automobile has at least two seats, some have four or five. Some seven. At a fair guess there is more than one seat each for every inhabitant of Bowling Green. So the whole town could go riding at one time if a strenuous effort were made.

Yet there are such things as pedestrians in Bowling Green. Even people that own cars walk sometimes. One of them recently walked into a street car. Possibly the motorman was dozing. In a town where every third man owns a car and the other two ride with him, there is not much left for a motorman to do. Anyway, the street car business was bad in Bowling Green and when the injured pedestrian sued the company and got a substantial verdict, the railroad magnates decided that the game was no longer worth the candle. So they threw up their hands and surrendered their cars, rails, crossties, franchises, etc., in satisfaction of judgment.

Of course, they might have gone before the Railroad Commission and obtained leave to raise their fares so as to get the amount of judgment out of their few remaining passengers. But the harder they squeezed, the fewer would be their passengers.

Whatever may have been the process of reasoning, the company quit. And the unfortunate plaintiff got, instead of a fat check, a pile of junk.

Blanket Franchise Discussed

Readjustment Essential to Preservation of Value of Railway to the Community

Preliminary discussion of the proposed blanket franchise submitted by the Virginia Railway & Power Company, Richmond, Va., was held recently by the committee on streets. Assistant City Attorney George Wayne Anderson and Directors Sayville and Trafford pointed to safeguards that must be thrown around the city's interests before such a franchise can be granted.

Chairman Puller advised the employment by the city of expert advisers in connection with the franchise discussion. The committee adjourned without action.

Colonel Anderson pointed out that the tentative draft now under discussion took many powers from the city and vested them in the state corporation commission. Director Sayville suggested, in lieu of the 8 per cent return asked for by the company, a sliding scale which would be an incentive to the company to give improved service, and upon which the rate might be fixed from time to time. If the city is to regulate the fare on a valuation, he thought a 6 per cent return would be sufficient to begin with, leaving the company the right to go higher if by better transit conditions it could then earn more, and that means should be provided for a reduction in fare if conditions justify it.

He urged that there must be an incentive to the company to give service, which it would not have on a guaranteed return on its investment as shown by a valuation. Mr. Trafford favored the employment of competent experts to make a valuation. Colonel Anderson questioned the wisdom of paying large sums for experts, and said that the committee, assisted by the department heads, could formulate a franchise acceptable to all. He would accept as the valuation for rate fixing the return made by the company to the Corporation Commission for taxation purposes.

Wage Cut for Track Men

A wage reduction affecting the unskilled laborers on the Washington Railway & Electric Company, Washington, D. C., was recently put into effect. The cuts range from 20 to 40 cents a day and will mean a substantial saving for the company. The readjustment puts recently acquired track men, who were hired at a lower figure than those already in the employ of the company, on the same basis. The wage reduction does not affect skilled workers or trainmen.

Men Ignore Union Officials' Warning

Strike in Akron Repetition of Old Story of Unreliability of Promises from Union

Eleven hundred employees of the Northern Ohio Traction & Light Company, Akron, Ohio, went on a strike Thursday, May 5, following the vote rejecting arbitration. The action was taken in the face of a threat by Patrick J. Shea, representative of the Amalgamated Association, that the charters of the four local unions on the lines of the company would be forfeited.

At the close of the first day of the strike, Mr. Shea went to Detroit to confer with W. D. Mahon and members of the executive board of the National Association. The executive board wired the presidents of the four locals to return the men to work and submit the question of the 15-cent wage reduction to arbitration.

Another vote was taken and the men refused arbitration for the second time. Mr. Shea then returned to Akron and held a conference with officials of the company. He asked if the company would agree to take all the men back to work and submit the wage reduction to arbitration. The company took the position that it would not deal with the radical leaders who were instrumental in calling the strike. The company also took the position that it would not agree to the appointment of the third arbitrator by the Governor of Ohio as was suggested. After a second conference the company agreed to take back all of the men if the 15-cent wage cut was accepted.

Mr. Shea and other representatives of the Amalgamated Association attended meetings of the men Sunday and Monday at which time a secret ballot was taken on the question of arbitration. The first local to vote was the men on the Akron-Bedford-Cleveland Division. These men voted for arbitration with the string attached that either the Governor of Ohio or Mayor Herman Witter of Canton was to name the third arbitrator. The company refused to accept the proposal on the ground that the Ohio Governor was prejudiced in favor of labor organizations and that Mayor Witter of Canton is a union official. That was the situation in the strike up to Monday night.

In the city of Akron, buses and automobiles are taking care of the traffic fairly well; in Canton and Massillon the situation is considerably worse and thousands of persons have been compelled to walk to and from their work.

The public attitude with the possible exception of Massillon, where there is a Socialist Mayor, is decidedly favorable to the company. In the city of Akron, the company has received hundreds of applications for work from local residents. In addition to that many applications have come from Cleveland, Canton, Massillon, Dover, Youngstown and other cities throughout northeastern Ohio.

After the return of Mr. Shea from Detroit nothing was said by the Amalgamated relative to the revocation of the local charters.

The striking employees planned to return to work Thursday, May 12, following an agreement reached on May 10. The strikers voted on May 11 to approve the settlement. The settlement provides the men shall return to work at the proposed reduction of 15 cents an hour, pending arbitration. It is agreed that the company shall select one arbitrator, the employees one, and the Governor of Ohio, together, with a man named by the company, shall choose the third arbitrator.

The points to be arbitrated are the hourly wage rate to be paid after May 1; the minimum work-day hours on interurban divisions; the maximum work-day hours on interurban divisions and the merit and demerit system of discipline in regard to Akron, Bedford & Cleveland and the Akron, Kent & Ravenna divisions. The company has named Charles Currie as its arbitrator. The first session is to be held within five days and the finding of the board is to be retroactive to May 1.

Men Reject New Orleans Wage Cut

The wage scale in the two-year contract under which the motormen, conductors, track workers, pitmen and car-house employees of the New Orleans Railway & Light Company, New Orleans, La., are now working, is to be materially reduced. Under the contract with the Amalgamated Association the scale may be readjusted on July 1, 1921, when the first year of the agreement expires, upon sixty days' notice given by either party to the contract.

Receiver O'Keefe, it has developed, sought to bring about a reduction in the pay of the men and to this end has addressed a communication to the union. Neither the union officials nor the receiver will discuss for publication the extent of the proposed wage cut.

At a meeting of the union employees held on May 6 the wage cut of the receiver, reported to be 13 cents an hour, was unanimously voted down.

If the proposed wage change be not effected by May 16, a provision in the contract stipulates that the wage question shall be submitted to arbitration, both sides to be bound by the findings of the arbitrators.

In discussing the matter the receiver said:

As the present wage scale was fixed last summer during the peak of high prices, and as the cost of living has been and is still coming down, I felt that it was proper to effect a revision of wages before July, 1922, unless the wage scale shall be readjusted by notice given not later than May 1, 1921. I have accordingly given the notice required.

I have to pay track and other common labor 43 cents an hour, while the city contractor is doing similar work with the same type of labor at 25 to 30 cents an hour.

Annual revision of wages is provided in the contract and upon failure to agree arbitration follows. The question, therefore, will be settled in an orderly manner as the parties have agreed upon in the contract.

City Must Perform Purchase Contract

Federal Court Upholds Puget Sound Company's Appeal for Specific Enforcement of City Contract

In a memorandum handed down in the Federal Court at Seattle, Wash., Judge E. E. Cushman denies the motion of the city of Seattle to dismiss the suit of the Puget Sound Power & Light Company to enforce specific performance of the city's contract for the purchase of the railway system from the power company for \$15,000,000.

The complaint, which the city moved to have dismissed, would also prevent any taxpayers from suing the power company in the Superior Court, or in any court other than the United States Court of this district. The suit of the Puget Sound Power & Light Company was filed in February following a suit in the Superior Court brought by a number of taxpayers seeking to prevent the city from payment of gross revenues of the railway into a special interest fund, until the expenses of maintenance and operation had been paid.

The Power Company was not named as a defendant in this suit. It immediately brought suit in the Federal Court and obtained a temporary restraining order to prevent the city from using any of the revenue in the interest fund for any other purpose than the payment of interest on the \$15,000,000 bonds.

The taxpayers in the Superior Court obtained a temporary restraining order against the city treasurer that prevented him from paying the gross revenues of the line into the interest fund, but this was dismissed on hearing, and the money for the March, 1921, payment was forwarded to New York. On Feb. 21 the temporary restraining order was obtained by the power company in the Federal Court to prevent diversion of the gross revenue of the railway to any fund until after the interest on the bonds was paid. The affidavit of the city treasurer setting forth the payment of the money was used by the city in its motion for dismissal in the Federal Court case.

In his decision, Judge Cushman said:

There doubtless is a question as to the propriety of considering the showing made by the affidavit on a motion to dismiss the bill; but, if the cause has become entirely moot by the payment of the installment of interest due on March 1, in the interests of the public and the court it would be the latter's duty to consider such a question at any stage of the proceeding, however, presented or suggested, and if it is certain that only a moot question remains to dismiss the suit in order to devote the time and effort which would be required for its consideration to other public business.

Upon the motion to dismiss the defendants contend that there is an adequate remedy at law; that the questions involved have become moot because of the payment March 1, after the institution of this suit, of the interest then falling due. They further contend that no duty devolved upon the defendant city of Seattle to set aside and create, a calendar month prior to March 1, a special fund to meet such interest.

Logically the last contention should be first considered for, if the defendants are right in that, it obviates any necessity for considering the other questions.

Ohio Interurbans Announce Wage Cuts

Arbitration of the wage differences between trainmen and the Cleveland, Painesville & Eastern (two divisions) and the Eastern Ohio Traction Company (two divisions), two interurban companies operating into Cleveland, will begin within the next ten days. Both these roads now pay their men 55 cents an hour for the first three months' service; 58 cents an hour for the next nine months and 60 cents an hour thereafter. Some time ago trainmen on these two lines were notified that the financial condition of the roads and general business conditions would make it necessary for the company to reduce the trainmen 12 cent an hour in each classification. The men refused to accept the cut and arbitration is to result.

Motormen and conductors employed by the Ashtabula Rapid Transit Company have had their pay cut, starting on May 1, from 45 cents an hour for the first four months, 47 cents an hour for the next eight months and 60 cents an hour after the first year, to 40, 42 and 45 cents an hour.

No definite settlement has as yet been reached between the Cleveland, Southwestern & Columbus Railway and the trainmen, who have so far opposed the company's announced wage reduction of 20 per cent.

Legislative Committee Finds Railroad Commission Efficient

The investigating committee of California Senators and Assemblymen, organized to report upon the recent complaints against the State Railroad Commission, has submitted its findings. Though some errors were found to have been made by the commission the committee claims the commission's record of efficient service is an enviable one. It is believed now that all misunderstandings have been cleared and co-operation between the people and the utilities and the utilities and the commission will be the result of the public hearings during the months of January and February at Sacramento, San Francisco, Los Angeles and other important centers of the State where protests against the commission were very strong.

In its finding the committee lays special stress upon the effect on the public mind of the abrogation of contracts existing at the time of the passage of the public utilities act. Though many contracts were abrogated by the commission the committee finds that the commission acted wisely and that failure to enforce the theory would have worked a hardship on certain consumers, for it is a sound principle that "all" consumers receiving the same class of service should be compelled to contribute alike to that fair return." The committee believes that a standard form of contract for service should be formulated by the commission to contain a provision showing that rates therein set forth are subject to change by the commission.

The committee further recommends that all literature relating to the sale and advertising of the stocks, bonds, etc., of any public service corporation be supervised by the commission and that nothing in that literature be permitted which can be construed by the public as being an indorsement or guarantee of the securities by the commission. The committee finally recommends that the commission more strictly enforce the penalties provided by the public utilities act and of the rules of the commission more particularly with regard to overcharges for extensions and service.

Navy Secretary Guest of Britton I. Budd

When Edwin Denby, Secretary of the Navy, went to Chicago on May 2 for the purpose of inspecting the Great Lakes Naval Training Station, he and party were taken to the naval station from Chicago and return on a special train of the Chicago, North Shore & Milwaukee Railroad as the guest of Britton I. Budd, president.

The train carrying the party was



BRITTON I. BUDD AND SECRETARY OF THE NAVY DENBY AT GREAT LAKES NAVAL TRAINING STATION

made up of three diners with a car of boy scouts attached. Luncheon was served en route and the cars then converted into chair cars for the remainder of the north-bound ride and the return trip.

Among other prominent men in the party were Captain D. W. Wurtzbaugh, commandant Great Lakes Naval Training Station; General John A. Le Jeune, commanding officer United States Marine Corps; Mayor William Hale Thompson; C. R. Francis, Commissioner of Public Works, Chicago; W. H. Finley, president Chicago & Northwestern Railroad; Fred Upham, treasurer Republican National Central Committee, and Wythe Denby, brother of the Secretary.

On returning to Chicago in the evening the Secretary attended a reception in his honor at the Union League Club which was conducted under the direction of Mr. Budd as general chairman of the club's public affairs committee and John Benham, vice-president of the International Register Company, as chairman of the sub-committee on army and navy entertainment.

Co-operative Benefit Association Organized

Employees of the International Railway, Buffalo, N. Y., have organized the I. R. C. Co-operative Benefit Association, patterned after the Co-operative Welfare Association of the Philadelphia (Pa.) Rapid Transit Company. Herbert G. Tulley, president of the International, which now is being operated by the Mitten Management, Inc., says a number of employees recently asked the company to assist them in obtaining insurance protection under the group plan, and out of the suggestions presented the management has caused the organization of the new association.

Every employee of the company who has been in service six months or more is eligible to membership and will have the opportunity to obtain a life insurance policy for \$1,000 and to participate in the sick benefits. The dues are \$1 a month and for every dollar paid in by the members the company will contribute an equal amount.

President Tulley explains the principal object of the new organization is to promote true co-operative effort between the management and employees. The affairs of the association are to be managed by a board of trustees consisting of members elected from the various departments of the company. One-half will be chosen by the members and the other half appointed by the company.

Wages Cut Pending Arbitration

Pending a wage settlement before a board of arbitration the East St. Louis & Suburban Railway and the East St. Louis Railway on May 1 reverted to the wage scale that was in effect prior to May 1, 1920.

The receivers of the Alton, Granite City & St. Louis Traction Company, which includes the Alton city lines, have notified the employees that wages will revert on May 15 to the scale in effect prior to May 1, 1920. The number of employees on all the lines mentioned is about 550.

The interurban employees, who have been receiving 59½ cents an hour, are reduced to 53 cents. They have asked for an increase to 85 cents. The city line men have been receiving 70 cents an hour, and are reduced to 46 and 50. They have requested an increase to 90 cents.

The board of arbitration is composed of C. E. Smith for the companies and Hunter B. Keigh for the employees, with the third arbitrator still to be selected.

Third New York Wage Arbitrator Chosen.—Former Supreme Court Justice Arthur E. Sutherland, Rochester, has been chosen third member of the board of arbitration to settle the differences which have arisen over wages between the New York State Railways and its employees.

Toledo Feeling Its Way

Commissioner Wilfred E. Cann at Toledo received a rebuff at the hands of the City Council when it refused to eliminate the Indiana line as he had requested in order to relieve the city system of one costly parallel line.

Progress is expected to be made on a power rate and in wage negotiations within the next two weeks. The wage contracts expired on April 1. They have not been renewed, but the platform men have not received any cut in wages.

During April the railway revenues fell off more than \$300 a day over the March revenues and they were more than \$300 a day less than February revenues.

The stabilizing fund fell below the fare increase mark when reports were made on May 10. However, the ordinance provides that the fare shall remain at the 6-cent level for six months.

West Penn Wages Reduced

Wages on the Coke Region, McKeesport and Allegheny Valley Divisions of the West Penn Railways, Pittsburgh, Pa., have been reduced 5 cents an hour effective May 1. The wages formerly paid were:

First three months.....	64 cents
Next nine months.....	63 "
Thereafter	70 "

The scale of wages, effective May 1, reduces these figures to:

First three months.....	59 cents
Next nine months.....	63 "
Thereafter	65 "

On the Kittanning, Leechburg and McDonald Divisions the rates were reduced 9 cents an hour. The rate formerly paid was:

First three months.....	63 cents
Next nine months.....	67 "
Thereafter	69 "

The new rate which went into effect on May 1, reduced these figures to:

First three months.....	54 cents
Next nine months.....	58 "
Thereafter	60 "

The reduction in wages was accepted by the trainmen without comment.

Consistency, Thou Art a Jewel!

A situation has arisen in Chicago which places the city administration in an embarrassing position. Some months ago the City Council in furtherance of its fight on increased fares took the stand that the local railway companies had violated the terms of the ordinance under which they operate and that they no longer have any legal right to exist. More recently the city became interested in a movement to have a "pageant of progress" in Chicago late in July, the exhibits to be placed on the municipal pier. The Chicago Surface Lines has a loop on an upper deck of this pier. Mayor Thompson, as a citizen and as president of the pageant association, applied to the Public Utilities Commission to compel the railway to remove these tracks to a lower level. Inasmuch as this would involve an expenditure of about \$200,000, the Sur-

face Lines resisted this petition. It points to the fact that Mr. Thompson as Mayor claims the company is operating without authority, while as president of the pageant association he had to recognize the company's existence. The commission will pass on the matter at an early date.

New Interurban in New Orleans

Negotiations that have been going on for some time between prominent property holders of the St. Bernard parish and business men of New Orleans, La., with large interests in industrial plants located in that section, culminated recently in the announcement that the Orleans-Kenner Interurban Electric Railway will be extended to St. Bernard parish. The road now operates between New Orleans and Kenner, La., in Jefferson parish.

The purpose of the extension is to give the Orleans-Kenner line, as the road is known locally, the right to traverse New Orleans through to Shell Beach in St. Bernard parish, a distance of about 30 miles. This will make a 46-mile line from Kenner in Jefferson parish to Shell Beach, St. Bernard parish.

H. K. Johnson, builder of the Orleans-Kenner electric interurban, who has recently resumed active management of the property, will undertake the construction of the proposed extension. Rights of way and the necessary financial assistance have been pledged by Mr. Johnson. A committee has been appointed to map out a route and secure the balance of the rights of way and to apply formally to the City Commission Council for a franchise for the new line.

Receiver Urges Municipal Ownership

If the city does not purchase the property of the Ashtabula (Ohio) Rapid Transit Company, the road will, by fall, be sold for junk and the tracks torn up. This is the opinion of Charles Currie, Cleveland, one of the receivers of the company. Mr. Currie, in company with A. R. Raymer, Pittsburgh, the other receiver, appeared before City Council recently and said he did not make the statement about scrapping the line with the idea of driving the city to purchase the property, but he gave this as his honest opinion of what will be done in case the deal that is proposed with the city does not go through.

Mr. Currie drew attention to the fact that the company had reduced the selling price of the property \$81,000 from the price of \$296,000 at which it was offered to the city at the time the deal for it was first contemplated, and after which the electors of the city voted a \$350,000 bond issue to buy the road and procure additional equipment and make necessary repairs. The last proposal of the receivers is that they will dispose of the property for \$215,000.

Paving Costs Reduced in New York

One of the important bills passed by the New York Legislature at the last session and signed by Governor Miller amends Section 178 of the Railroad Law in relation to paving and repair of streets. The change consists of the following insertion: "but nothing contained in this section shall require any street railroad corporation to make pavements or repairs over openings made in the streets by any person, municipality or corporation other than such street railroad corporation, for any purpose other than the pavement or repavement of the street." Under this provision the electric railway companies will not be required to lay pavements or make repairs to pavements over openings made in the streets by any person, municipality or corporation for the construction or repair of sewers, water mains or any other similar sub-surface work.

Matthew Brush Testifies in Investigation

The special committee of the Massachusetts Legislature, which is investigating alleged irregularities in the passage of street railway legislation in 1918 and 1919, has been granted an extension of time to May 16, for filing its report. All witnesses have been heard, practically every member of the two Legislatures having appeared voluntarily. Matthew C. Brush, former president of the Boston Elevated Railway, testified, as did also several bankers and brokers.

Mr. Brush was easily the star witness. With that same engaging frankness and refreshing good nature which so often in the past has disarmed hostile and unjust criticism of the railway management, Mr. Brush recited in great detail the steps leading up to the enactment of the so-called public control bill of the Boston Elevated. He told of his own strenuous efforts to convince the members of the Legislature of the necessity for relief for the elevated, and as far from denying having met and talked with legislative members at clubs and at private homes, he said it was his job to talk to everyone, from newsboy to Governor, anywhere he could get hold of them. He strenuously denied, however, that any money, gifts or inducements of any kind were offered to influence votes. He knew of no members speculating in street railway stock at that time, and was positive that if they did so it was not on the suggestion or under the influence of the railway management.

As a result of the questioning of former legislators it was found that out of several hundred members only about twenty-five or thirty were involved in the stock speculations, some of these having purchased Boston Elevated securities, others Massachusetts Electric, and a few "took a flyer" on both. They were about equally divided between Republicans and Democrats, and many

of them were opponents of the legislation in question, and voted against it. During the whole course of the testimony no witness showed any connection between the railway managements and the stock speculations of the legislators, nor was there any allegation of improper influence or inducements offered by the railway managements.

Speculation is rife in political circles as to what recommendations the committee will make in its report as to possible action to be taken against those men who bought railway stocks and then voted on bills affecting their financial status. It is generally believed that the committee may turn the evidence over to the District Attorney for such action as he may see fit. Some elements are demanding that members should be expelled who speculated in the stocks and are still in the Legislature.

Provision Recommended for Municipal Ownership

Without a dissenting vote, the sixteen members of the committee on municipal and parochial affairs of the Constitutional Convention, now sitting in Baton Rouge, La., has favorably reported an ordinance which gives the city of New Orleans the right to own and operate all of its public utilities, expropriate them and conduct them under municipal ownership. Commissioner Paul Maloney, of the Public Utilities Committee, expressed his pleasure on learning that the measure had been approved by the committee and remarked that in case of its adoption by the convention, means would be available to the city of New Orleans to call municipal ownership to its aid whenever the need arose for such action.

Be Sensitive to Suggestion If You Would Rise

Words of advice from octogenarians on "how to live long and happily" usually fall on deaf ears. But a suggestion on how to be of greater service from the "man higher up" on the job is not always to be spurned. Such a piece of literature is "The Thing That Will Count Most If You Want to Be Promoted," a reprint of an interview with Samuel Insull, president of the Commonwealth Edison Company, Chicago.

In a simple and interesting way Mr. Insull tells of his own early experience. A perusal of it will encourage the countless number of employees who enter business with little or no equipment and will give those who are endowed with special qualities and accomplishments an insight into how high they can mount. To do more than what is expected of you is no new rule for success. Conductors and motormen of railway properties who do a trifle more than their fellow employees in the way of courtesy and are a bit more solicitous for the safety of the patrons eventually find themselves in line for positions higher up.

Wages Reduced in Grand Rapids

Wages for trainmen of the Grand Rapids (Mich.) Railway were reduced 10 cents an hour according to the terms of the new agreement recently signed which expires May 1, 1922. The rates were formerly 56 cents an hour for the first three months, 58 cents for the next nine months and 60 cents an hour thereafter with 5 cents additional for safety car operators. The new scale now in effect is 46 cents, 48 cents and 50 cents, with 5 cents extra for safety car operators. Overtime work will be paid for at the rate of 10 cents an hour additional, with a minimum overtime pay of one hour. The open shop principle was continued as a clause of the agreement. The contract in effect last year made it compulsory that trainmen should work not to exceed six days in any one week. In the new agreement this is made optional with the employee, who may now work seven days a week, permitting his one day a week off to accumulate so that he may take his time off all at one time, or he may work continuously without any time off.

News Notes

New Franchise Drafted.—The City Council of Galesburg, Ill., recently agreed upon a franchise ordinance for the Galesburg Railway, Lighting & Power Company. The company has been operating for some time now without a franchise because the City Council could not agree on a new one. The franchise as now drafted provides for extensions of car line and includes some agreement for service on the part of the company over the track which the city proposes to build to Lincoln Park.

Wages Undisturbed Pending Negotiations.—The officials and members of the Amalgamated at Pittsburgh, Pa., on April 28, provisionally accepted a proposition from receivers of the Pittsburgh Railways that they continue in effect present wages and working conditions for one month while negotiations are continued. The wage scale expired at midnight on April 30. The extension will continue it in force until June 1. Conferences have been proceeding between the receivers and the men's wage scale committee, the working conditions being under discussion. The wage question has not been brought up, neither side indicating to the other that it had anything to suggest.

Mayor Urges Municipal Ownership.—Mayor Marshall of St. Joseph, Mo., has come out for municipal ownership of public utilities. In his recent annual message the Mayor said: "Our citizens should bear in mind that we can buy approximately \$14,000,000 of public utilities and our taxes be not raised

a cent. The last Legislature gave us the right to assess 20 per cent of our valuation to buy public utilities and the expenses and interest charged directly against the utility and not the city, so that we can, if the electors and your honorable body desire, take over the street railway, the gas company and waterworks, and I believe it is time to start on these improvements and acquisitions. We should do it now and not let it drag."

Programs of Meetings

New England Street Railway Club

The New England Street Railway Club will hold its next meeting in Hartford, Conn., on May 18, in a joint session with Company Section No. 7 of the Connecticut Company. It is planned to have the Boston members take the 9.15 a.m. train from the South Station, members at Worcester, Springfield and other places being picked up en route.

An informal luncheon will be served between 12 and 2 p.m. at the Weathersfield carhouse in Hartford. At 3:30 p.m. a short talk on "Appraisals" will be given by E. Irvine Rudd, chief engineer of the Connecticut Public Utilities Commission, followed by a moving picture exhibition.

The dinner will be held at 6:30 p.m. at the Hartford Club. The subjects of the talks have not been announced, but Richard T. Higgins, chairman of the Connecticut Public Utilities Commission, and Lucius S. Storrs, president of the Connecticut Company, have promised to speak.

Southwestern Electrical & Gas Association

At the Street & Interurban Railway sessions of the Southwestern Electrical & Gas Association Convention, which will open on May 18 at Galveston, Tex., notice of which was made in the ELECTRIC RAILWAY JOURNAL, issue of May 7, subjects of great interest to the industry will be discussed in an informal way. They are as follows:

Modern Fare-Collection Methods and Their Relation to Accident Prevention, Alves Dixon, superintendent El Paso (Tex.) Electric Railway.

The Desirability of the Universal Adoption of a "Front Entrance" for all Cars, Both Single and Double-truck, as a Means of Safer and Quicker Service to the Public, C. O. Birney, inventor of the "Safety Car."

The Inspection of Cars on a "Mileage" Basis Instead of on a "Time" Basis, F. J. Bennett, Houston (Tex.) Electric Company.

The Urgent Necessity of Greater Economy and Efficiency in Car Lubrication, Walter Slivus, superintendent of equipment, Texas Electric Railway.

The Economy and Efficiency of the Substitution of "Ball" or "Roller" Bearings for the Ordinary "Friction" Bearing, J. T. Porter, Northern Texas Traction Company.

General Track and Roadway Problems of the Minute, A "Round-the-Table" Discussion for all Attending.

The Advantages of the "Bow" or "Pantograph" Trolley Collector over the Ordinary Trolley-Wheel, A Manufacturer.

A Practical Experience in the Use of "Telephone Dispatching" on City Lines, W. W. Holden, superintendent of transportation, San Antonio Public Service Company.

Where It Is Economical to Substitute Steel Trolley Wire for Copper or "Composite" Trolley Wire, L. E. Delf, Electrical Engineer Northern Texas Traction Company.

Modern Car-Painting Methods, Round-the-Table Discussion.

Training the Supervisory Forces, the Chairman.

Financial and Corporate

Missouri Tax Upheld

U. S. Supreme Court Rejects Plea of Interurban with Respect to Method of Fixing Tax Value

The contentions of the St. Louis & East St. Louis Electric Railway in its case against the State of Missouri in the matter of a tax levied on its property were denied by the Supreme Court of the United States in an opinion handed down on May 2.

The electric railway, known as the Bridge Electric Company, was the owner in 1906 of 0.865 of a mile of electric railway constructed upon and extending from the easterly to the westerly end of the Eads Bridge. In that year the Missouri State Board of Equalization valued the portion of this railroad which was within that state at \$186,019 and levied a tax upon it for state and local purposes. The Bridge Electric Company contested the tax and sued to recover the amount collected, charging that the tax is invalid on the ground that it constitutes a direct and unconstitutional burden on interstate commerce.

\$500,000 PER MILE

The state statute provided that in valuing railroads for taxation the State Board of Equalization should determine the total value of the entire property in the state, tangible and intangible, of each company and that from this total it should deduct the value of all its tangible property and then "enter the remainder upon the assessment list under the head of 'all other property.'"

The Board of Equalization valued all the rolling stock, poles, wires and cash of the Bridge Electric Company at \$32,630; the road-bed and superstructure at \$5,000 per mile and "all other property" at \$500,000 per mile, making a total value per mile of \$537,630.

There were 0.346 of a mile of the track in the State of Missouri and this proportion of the total value per mile, amounting to \$186,019 (of which \$173,000 was included under the item "all other property"), was the amount on which the disputed tax was levied.

It was not contended that this valuation was unreasonable in amount but only that the property of the company which was valued as "all other property" consisted solely of its franchise to conduct interstate passenger traffic over the interstate bridge and that, therefore, the tax so far as levied on the valuation placed on the property is concerned, is a direct tax and burden on the right to engage in interstate commerce and thus unconstitutional.

The Supreme Court states, however, that "the stipulation on which the case

was tried does not sustain this contention."

In concluding the court says:

We cannot doubt that the contracts we have described, which very plainly gave to this short-line of railway much of the value as a going concern which led the company to bond and capitalize it at \$1,000,000 and the board to value it at approximately one-half that amount, must have been taken into consideration by the board and that, therefore, the contention that the tax was levied exclusively upon the franchise to do an interstate business is not sound and must be rejected.

The opinion of the court was delivered by Justice Clarke.

Large Saving on Labor in Kansas City

Continuous and steady improvement in earnings, under the receivership, is reported for the Kansas City (Mo.) Railways. Despite bad weather and a definite amount of unemployment gross revenue is maintained at a substantial level compared with former similar periods, and there is a constantly bettering relation between revenue and expenses.

One item that offers interesting opportunity for comparison is that of labor cost. The company is operating the largest number of cars in its history, 720 on the high peak of schedules, with 900 fewer employees than a year ago. Several developments make this condition possible. Changes in the power plant, including installation of an ash carrying equipment, reduce the labor requirement there. In the shops 100 fewer men are employed than a year ago; last year the shop was loaded to capacity in the repair and overhauling of cars, and equipment was put into first class shape.

More Representative Name Chosen

The directors of the Monongahela Valley Traction Company, Fairmont, W. Va., have voted to change the name of the corporation to Monongahela Power & Railway Company and not the Monongahela Traction & Light Company, as noted in the *ELECTRIC RAILWAY JOURNAL* for May 7, page 874.

Officers of the company state that the change is brought about by the fact that the power and lighting departments of the concern have been growing by leaps and bounds not only along the lines of the interior, where great power houses have been built and the company is moving large quantities of coal and other freight, but on the lines in Parkersburg and along the interurban as well. The change of name it is believed will be to the interest of the company as it relates to the chief department of the corporation, and it will improve the market for the securities of the company.

End of Receivership Urged

City Says Pittsburgh Railways Is Rebuilding Lines Out of Earnings at Ten-Cent Fare

George N. Munro, special solicitor for the city of Pittsburgh, Pa., in charge of utility legislation, declares that the Pittsburgh (Pa.) Railways during the year 1920 earned more than \$2,000,000 over and above operating requirements and that the surplus fund, swelled on account of excessive fares, has been used for improvements and betterments instead of protection for creditors. A report by him to this effect urging the end of the receivership was read on May 3 before the City Council and Mayor Babcock.

The report recommends that the property be formally returned to the bondholders in view of the fact that the Public Service Commission valuation of \$62,500,000 is less than the \$64,000,000 of outstanding securities bearing interest. The conclusions drawn by Mr. Munro are based on statements of earnings and expenditures obtained on April 1 from the receivers and on engineers' estimates and estimates made by the receivers before the Public Service Commission.

According to Mr. Munro after an allowance of \$15,986,000 for expenses, which included \$985,000 for normal depreciation and an excess of \$1,900,000 for wages over 1919, figured on the budget basis by engineers, the company received income ranging from \$600,000 to more than \$2,000,000 in excess of all expenses and a 7 per cent return depending upon the valuation accepted as a basis for figuring the earnings. The valuations on which this computation was made were taken as the figure of \$48,000,000 by the city's engineer, \$70,000,000 for the company's engineers and \$62,500,000 found for the Public Service Commission.

Mr. Munro contended that the property was being rebuilt out of earnings and at the expense of the car rider whereas much of the work done was really a charge to capital. He argued that while it was desirable that the property be properly maintained, the public, if it was to pay for rehabilitation as well as for transportation, should have something to say about the disbursement of the excess money.

The reply of the receivers characterized the deductions made by Mr. Munro as "palpably erroneous and at best irrelevant." They contend that such improvements as were made were carried out in the interest of the car riders at the behest of the court and in pursuance of the court's policy that the service furnished by the receivers should be regarded as the paramount purpose in their administration. They characterized as lacking in every element of truth the charge by Mr. Munro that instead of using this fund to take care of unsecured creditors, for whose protection this receivership was invoked, they are building up the property out of earnings and thereby unduly con-

tinuing the receivership. According to the receivers "it is evident that no policy or action is possible to meet the divergent views of the various city officials and that no determination can be reached except by adjudication." Further the receivers say that the city has unnecessarily delayed the valuation proceedings. The receivers recite that in March, 1920, the State Public Utilities Commission fixed the valuation of the company at \$62,500,000, but that the city waited about six months, or until near the expiration of the time for filing an appeal from the decision of the commission, before its representatives took an appeal to the Superior Court. Argument was set for April 15, 1921, but as that date approached a postponement was asked and granted over the protest of the receivers.

On May 6 a conference was held with members of the Council at which the receivers were asked to attend to discuss the possible reorganization of the railway. At that conference a letter was read which had been written by Mr. Munro to Solicitor Pritchard. In this communication Mr. Munro said that the receivers "instead of coming back at us with equally conclusive evidence content themselves with making a general denial." He confessed himself disappointed at the answer of the receivers, and was "inclined to think that their reply is a studied effort to confuse the issue." "In short," said Mr. Munro, "you will notice they made no effort to give any items to substantiate their reply." He also says the company is in error with respect to the delay by the city in the proceedings before the court.

Briefs Filed in Lease Case

The city of Philadelphia has filed a brief in the Supreme Court of that State setting forth the position taken by the city in appealing against a decision of the Superior Court to the effect that the Public Service Commission has no authority to inquire into the rentals paid by the Philadelphia Rapid Transit Company to the underlying concerns. The printed briefs were filed by the city preparatory to the argument, in which the same contentions are raised as were made in the Superior Court. Briefs on behalf of the Philadelphia Rapid Transit Company and its subsidiaries were also prepared for filing.

The Rapid Transit Company is paying to the underlying companies rentals amounting to approximately \$10,000,000 a year for the use of their franchises. The city maintains that the Public Service Commission has the right to ascertain whether or not these rentals are excessive, whereas the Superior Court has ruled that inquiry into this matter is not one of the commission's lawful functions.

The city bases its appeal on the dissenting opinion of Justice Keller, who did not agree with the majority of the Superior Court in deciding in favor of the underlying companies.

\$1,000,000 Increase in Gross Prospects Are that North Shore Road Will Profit Materially by Decreasing Cost

An increase of \$955,748 in gross operating revenue of the Chicago, North Shore & Milwaukee Railroad is shown in the annual report for the year ended Dec. 31, 1920. Despite this very favorable showing made by the company in securing new business, the net operating revenue as compared to the previous year increased only \$46,164 and the net income \$1,172. The accompanying consolidated income account shows the comparison with the year 1919 for the various items.

	1920	1919	Increase
Gross operating revenue.....	\$4,193,669	\$3,237,921	\$955,748
Operating expenses.....	3,229,048	2,319,464	909,584
Net operating revenue.....	\$964,621	\$918,457	\$46,164
Taxes.....	151,746	163,101	11,355*
Operating income.....	\$812,875	\$775,356	\$37,519
Miscellaneous income.....	10,332	17,879	7,547
Gross income.....	\$823,207	\$773,235	\$49,972
Fixed charges.....	390,196	341,396	48,800
Net income.....	\$433,011	\$431,839	\$1,172
* Decrease			

The consolidated income statement for the years 1916 to 1920 inclusive forms an interesting exposition of the manner in which the business of a railroad may be built up by bettering the physical property and giving high grade service.

The report reviews briefly the operating conditions pertinent to the financial statement and also the physical improvements made in the property during the year. It was pointed out that the increase in the gross operating revenue was almost all absorbed by the increased cost of labor. The improved service resulting from the operation of safety cars on the city lines of Waukegan, Ill., brought an increase in revenue on those lines of 39 per cent, and for the first time they are showing a tendency toward becoming self-sustaining. The rate of fare on both the Milwau-

\$800,000 was for new equipment contracted for in 1919. During the year the company authorized and issued \$1,500,000 of ten-year 7 per cent sinking fund notes secured by first mortgage bonds, of which \$707,400 were issued in 1920. The company paid off and cancelled \$600,000 of collateral notes and \$72,000 of equipment notes and purchased and cancelled \$27,000 of the ten-year sinking fund notes.

Among the physical improvements mentioned in the report are the construction of 9,982 ft. of new sidings at sixteen locations in Illinois and Wisconsin; the construction of 4,500 ft. of new roadway, paved with brick on concrete base, and paralleling the old road-

way, in order to make room for the double tracking of the line at this point; the widening and ditching of cuts and placing of 4,358 lin.ft. of drain tile; the replacement of 65-lb. rail on ten miles of single track with 80-lb. rail; the renewal of 20,000 ties; the placing of 47,000 cu.yd. of ballast; the surfacing of 26 miles of single track; the rebuilding of ten miles of right-of-way fence; and the erection of a new substation building at Ravinia for which there was purchased and installed an automatic controlled 1,000-kw. rotary converter.

During the year an Employees' Mutual Benefit Association was formed. The members of this organization will receive a sick benefit of \$6 a week and a death benefit of \$300. Each member pays \$1 a month and the company contributes 50 cents a month per member

	1916	1917	1918	1919	1920
Operating revenue.....	\$1,157,191	\$1,751,373	\$2,899,975	\$3,237,921	\$4,193,669
Operating expenses.....	714,887	1,114,512	1,856,038	2,318,464	3,229,048
Net operating revenue.....	\$442,304	\$636,861	\$1,043,937	\$918,457	\$964,621
Taxes.....	66,038	95,680	185,822	163,101	151,746
Operating income.....	\$376,266	\$541,181	\$858,115	\$755,356	\$812,875
Miscellaneous income.....	6,208	4,858	9,470	17,879	10,332
Gross income.....	\$382,474	\$546,039	\$867,585	\$773,235	\$823,207
Fixed charges.....	237,996	266,580	332,056	341,396	390,196
Net income.....	\$144,478	\$279,459	\$535,079	\$431,839	\$433,011

kee city lines and the Waukegan city lines was increased from 5 cents to 6 cents during the last half of the year. On Sept. 1, 1920, the interstate rates on the interurban lines were increased from 2.5 to 2.7 cents per mile and on Nov. 1, 1920, to 3 cents per mile. On Sept. 17 an increase of approximately 33½ per cent in freight rates became effective.

The amount expended during the year for additions and betterments and for reconstruction was \$1,338,079, of which

toward the support of the association, which now has a membership in excess of 500.

An enlargement of the safety organization and the development of a fine spirit of co-operation on the part of all employees not only in accident prevention work but in closer observance of rules and a desire to give the public the best of service is pointed out as one of the features of the year's progress. There were held 134 meetings of employees to promote safety.

\$4,936,976 Fixed as Lynchburg Value

Elements of Value Include Reproduction Cost New Dec. 31, 1916,
This Cost Appreciated 10.8 per Cent, Actual Cost of Additions
During War Period, and Developmental Costs

A. L. Drum & Company, consulting engineers, Chicago and Philadelphia, representing the Lynchburg Traction & Light Company, Lynchburg, Va., filed with the Corporation Commission of the State of Virginia on May 10 a final report on the cost of reproducing and developing the properties of the Lynchburg company. The valuation was made in accordance with the principles set forth by the Corporation Commission in its opinion of March 18, 1921, acknowledging the application for increase in light and power rates.

THE report comprises (a) the cost to reproduce the physical property as of Dec. 31, 1916, based on average prices prevailing from 1912 to 1916 inclusive; (b) cost to reproduce the physical property as of Dec. 31, 1916, based on 10.8 per cent normal appreciation to Feb. 1, 1921; (c) actual cost of additions to property from Jan. 1, 1917, to Feb. 1, 1921, and (d) developmental costs.

The basis of the valuation as prescribed by the commission excluded the use of abnormal war prices except actual expenditures made under such conditions. The opinion of the commission provided that "to the probable fair 1914 reproduction value may reasonably be added a normal appreciation for the years since that time. Had there been no war there would have been a gradual rise in prices due to increasing costs of production. Thus we have a basis which allows the company the benefit of appreciating values in normal times, based on pre-war values plus actual additions made at war prices."

The engineers, in conforming to this ruling, assumed that the average unit prices prevailing for the five-year period from 1912 to 1916 inclusive would represent fair average prices prevailing as of June 30, 1914, and applied such to the Dec. 31, 1916, inventory of the physical property. The appreciated value was derived by increasing the 1912-1916 valuation by 10.8 per cent, this being 1.57 per cent per annum compounded for six years and seven months. It was derived from price indices on about 340 commodities for the sixteen years from 1900 to 1915 inclusive. The trend of prices over this fairly uniform period of rising prices indicated an in-

crease of 1.57 per cent per year compounded, and was held to represent a fair index of normal appreciation in values. A chart showing the price indices of commodities and the derivation of the 1.57 per cent is attached to the report.

The treatment of developmental costs is of particular interest as it embraces three main subdivisions: (a) Expenditures for obsolete equipment and construction; (b) cost to unify the system; (c) losses during the early years of operation. The total developmental costs as reported equaled about 16 per cent of the valuation of the physical property.

The expenditures for obsolete equipment and construction comprised the depreciated value of the property at the time of supersession and was subdivided as between the railway, electric light and gas departments. The developmental costs under the railway department represented superseded horse car lines, power stations, car houses and original electric cars. Under the electric light department the developmental costs included superseded power station equipment, transmission lines and street lighting equipment destroyed prior to the end of its useful life due to consolidations and changes in the art. Reliable data covering superseded property in the gas department were unavailable and as that superseded was known to have had a normal life no claim was made for developmental costs in this department.

The cost to unify the system represented an estimate of the cost incident to the creating and consolidating of the various thirteen companies comprising the present Lynchburg Traction & Light Co. It was derived after an in-

vestigation of such records of the companies as were available.

The losses during early operation represented the deficit of return on the investment during the early period of operation up to the time the business had become established on a paying basis. A summary of the cost of reproducing and developing the property as of Feb. 1, 1921, is given in the accompanying table.

TWENTY MILES OF RAILWAY

The accrued depreciation as reported represented the amount of existing depreciation due to wear and use as determined by inspection and measurement in the field. It is not based on theoretical depreciation due to age or obsolescence. The amount of accrued depreciation for the railway department is given as \$140,203, for the electric light department as \$108,640 and for the gas department as \$52,635, making a total of \$301,478.

The Lynchburg Traction & Light Company owns and operates the street railway, electric light and gas utilities in Lynchburg and vicinity, the street railway consisting of 19.25 miles of single track, thirty-nine passenger cars and three service cars. Power is obtained from the Ruesens hydro-electric station and the Blackwater Creek steam station, both of which jointly serve the railway and electric light departments. The generating and converting equipment devoted exclusively to the railway department aggregates 1,650 kilowatts capacity, all of which is located in the Blackwater Creek steam station.

The Ruesens hydro-electric station, located on the James River about 4½ miles north of Lynchburg, is equipped with three water wheels with a generating capacity of 2,500 kw. The dam is of cut stone masonry with concrete crest, about 425 ft. long, 32 ft. high and develops a net effective head of 22 ft.

ONE-THIRD POWER CAPACITY FOR RAILWAY

The Blackwater Creek station is a steam station of 2,000 kw. capacity, not modern in construction, and is utilized as an auxiliary plant in connection with the Ruesens hydro-electric station, to which it is connected by a new double transmission line. There are 5,335 residence, commercial and power meters in service, and 731 municipal series incandescent street lamps are connected to the system. Of the total amount of power generated, approximately 36.4 per cent is used in the operation of the railway.

The gas plant consists of three benches of inclined coal gas retorts, six retorts to each bench, also two Lowe water gas sets, with the necessary condensers, scrubbers, purifiers and residual equipment. The plant capacity is about two and one-half million cubic feet of gas per day. There is one 50,000 cu.ft. relief holder and one 200,000 cu.ft. storage holder. The distribution system consists of 41.28 miles of gas mains, with 3,752 meters connected.

SUMMARY OF COST OF REPRODUCING AND DEVELOPING THE LYNCHBURG PROPERTY AS OF FEB. 1, 1921

	Railway Department	Electric Light Department	Gas Department	Total
Physical property:				
Estimated cost to reproduce the physical property as of Dec. 31, 1916, based on average prices, years 1912-1916, inclusive.....	\$1,328,998	\$1,714,295	\$582,806	\$3,626,099
Estimated cost to reproduce the physical property as of Dec. 31, 1916, based on 10.8 per cent normal appreciation to Feb. 1, 1921.....	1,472,530	1,899,438	645,749	4,017,717
Actual cost of additions to property Jan. 1, 1917, to Feb. 1, 1921.....	49,476	73,224	112,464	235,159
Total cost to reproduce the physical property as of Feb. 1, 1921.....	\$1,522,000	\$1,972,662	\$758,213	\$4,252,876
Developmental costs:				
Expenditures for obsolete equipment and construction.....	\$134,503	\$95,770	.....	\$230,273
Cost to unify system.....	73,794	94,328	\$31,878	200,000
Loss of interest during operation.....	93,654	119,715	40,456	253,826
Total developmental costs.....	\$301,951	\$309,813	\$72,334	\$684,099
Total cost of reproducing and developing the property.....	\$1,823,951	\$2,282,476	\$830,548	\$4,936,976

New Rhode Island Company Selects Directors

Former United States District Attorney Harvey A. Baker has been nominated by Mayor Gainer of Providence, R. I., to represent the public on the board of directors of the United Electric Railways, which is soon to operate the electric railways now run by the Rhode Island Company. The election of Mr. Baker and eight other directors was recommended by the joint reorganization committee.

The other proposed directors are Zenas W. Bliss and George H. Newhall, appointed by Governor San Souci and confirmed by the Senate; Ralph S. Richards, representing the Rhode Island Hospital Trust Company, representing the holders of the general mortgage bonds; Edward B. Aldrich, Frederick S. Peck, Richard B. Comstock, Harold J. Gross, and J. Cunliffe Bullock, representing the stockholders.

At present and for the purpose of effecting a temporary organization there are five stockholders of the United Electric Railways. These will be called together soon, and are expected to confirm the choice as directors of the five men nominated to represent the stockholders.

\$4,100,000 Value Placed on Interurban

The Public Service Commission of Pennsylvania in the case of the city of Erie vs. the Buffalo & Lake Erie Traction Company has found the fair value of the property of the railway to be \$4,100,000. It holds that upon this sum the company is entitled to a fair return over and above its operating cost and annual maintenance. The decision of the commission is to the effect that lines of street railway track that have been abandoned and are no longer used or useful in the public service should not be included in any fair value for rate-making purposes.

The commission further holds that a power plant which is no longer used by a street railway but is leased to an electric company at an annual rental is a potential asset and will be included in a fair value for rate-making purposes. In its reproduction cost estimate the commission made allowance for overhead on real estate, depreciation and working capital. Bond discount was not allowed. The commission further said that the market value of stocks and bonds issued by an interstate corporation covering property both within and without Pennsylvania afforded no proper criterion as to the value of the property for rate-making purposes within the State.

The commission also reiterated the fact that it is well-settled law that an active going concern rendering efficient service has a greater value than an idle one and that going concern values should be considered and included in determining the fair value of a utility for rate-making purposes. Finally the commission recommended the issuing of

school tickets good between certain hours and the sale of book tickets at a reduced rate.

Indebtedness Limitation Removed

In regard to the recent action by the Minneapolis (Minn.) Street Railway in removing its limit of indebtedness beyond \$1,200,000, W. D. Dwyer, counsel for the company, explains:

The limitation was put on when the stockholders had no idea of the size to which their business would grow. It would have been impossible for the company to live up to it and continue in business. No stockholder ever objected to the directors disregarding it, and if one had there is no doubt that the courts would uphold the company. It was just a dead letter—one of those laws that are never lived up to—and we decided to get rid of it.

Movement in Interest of New York Security Holders

An organization known as the Public Utility Security Holders' Association has recently been formed in behalf of the 55,000 holders of the securities of the electric railways in Greater New York. Headquarters have been established at 605 Fifth Avenue, New York, with Ernest P. Fredericks as managing director. A uniform plan of assessment consisting of 50 cents per \$1,000 bond or 5 cents per share of stock has been made, with a minimum assessment of \$1. The advisory board at present consists of ten members who are men of standing in their business and professional life and representative of the great majority of security owners. The members are E. H. Hicks and Henry Franciscus, Brooklyn; Bernhard Blitzer, Gustav Kimpel, C. A. Fairchild, S. H. P. Pell and Theodore Koupal, New York; E. S. Gardner, Springfield, Mass.; Wallace Pyle, Jersey City, N. J., and E. G. Hamersly, Philadelphia, Pa.

Mr. Fredericks has been identified in the past with campaigns conducted in the interest of traction security holders in Boston and in Canada.

Dayton Roads All Losing Money

That the railway of Dayton, Ohio, are facing bankruptcy was announced at a conference called to consider plans to bring about more favorable conditions among the companies there.

Harry P. Clegg, president of the Oakwood Traction line, advanced the claim that not one of the local companies was making operating expenses. The Oakwood line, which extends from East Oakwood to Daytonview, is said to have been running behind steadily for five or six years. The Dayton line has paid no dividends for four years and has met expenses by borrowing money, and the Peoples' Company, owners of several divisions, paid its last dividend out of its surplus.

Representatives of the various companies informed the City Commission that under existing conditions there was no use continuing operations. However, no plea was made for an increase in fares and it is understood there will be none.

Financial News Notes

Preferred Stock Dividend Resumed.—

A quarterly dividend of 1½ per cent has been declared on the outstanding \$2,300,000 of preferred stock of the Cumberland County Power & Light Company, Portland, Me., par value \$100. This is the first dividend on the preferred stock since May, 1918, when 1½ per cent was paid in scrip.

Interurban and City Accounts Adjusted.—A settlement of accounts between the Cincinnati (Ohio) Traction Company and the Interurban Railway & Terminal Company has been approved in the Common Pleas Court. Under the agreement the traction company secures title to the former interurban tracks and overhead wires in the former villages of Pleasant Ridge and Kennedy Heights. The traction company is to pay the Interurban \$5,000 in cash and cancel \$49,000 of receiver's certificates issued by the interurban in favor of the Cincinnati Traction Company.

New Interest in Purchase by City.—The public utilities committee of the Board of Supervisors of San Francisco, Cal., has agreed to recommend that \$15,000 be made immediately available for the use of City Engineer M. M. O'Shaughnessy in making the necessary study of the United Railroads properties and recommending a price at which the city can afford to take them over. Reasons urged upon this committee by various organizations for this action are: the need of (1) one fare with a universal transfer, (2) the elimination of four-track conditions on Market Street, and (3) the very large majority by which the Charter Amendment No. 30 was carried at the last election. (This amendment provides for the purchase of public utilities on the installment plan.)

Sale Ordered by Court.—Under an order issued by Judge E. B. Museout of the Forty-fourth District Court at Dallas, Tex., the properties of the Standard Traction Company, Dallas, were ordered to be sold at public outcry on May 3 to satisfy a judgment for \$5,000 in favor of C. C. Farmer and wife. The Standard Traction Company owns the railway serving the Mount Auburn and Parkview additions to the city of Dallas, now leased to the Dallas Railway and being operated by that company. J. H. Power is president of the Standard Traction Company. The company was organized by the real estate firm that placed these two additions on the market. It has offered to deed the property to the Dallas Railway with the condition that through service be maintained from the business district to these additions.

Traffic and Transportation

Jitney Ordinance Works Well

Regulatory Measure in Kansas City Restricts Autos to Routes Where There Are No Car Lines

Elimination of jitneys from the streets of Kansas City, Mo., having electric railway tracks has had many beneficial effects since the ordinance became effective on April 7. The ordinance had been passed previously by the City Council, but on April 7 an order from the Circuit Court of Jackson County released a temporary injunction secured by the jitney operators, and new schedules and routes for jitneys were established.

The most striking effect of the new plan of "co-ordinate" rather than competitive operation of transportation facilities is in the relief of traffic congestion. The removal of nearly 400 jitneys that had constantly operated on street car streets is an obvious relief to traffic congestion, particularly notable in rush hours.

The improvement in the accident record directly attributable to the elimination of jitneys from tracked streets has several significant bearings. Not only is service maintained at higher efficiency but there is a noticeable reduction in repair and wreck crew costs, and in the many expensive concomitants, including litigation of accidents.

RAILWAY SERVICE INCREASED

A second public benefit resulting from elimination of jitneys from tracked streets is the marked increase in street car facilities made possible by gain in patronage. The company had promised that more cars would be operated when jitneys were assigned to streets not having tracks. Sixty-five cars were added to service on April 7; and all these have since been retained.

The number of jitneys retired has been almost exactly the same as the number of cars added. The increase in number of cars was about 10 per cent; while the increase in revenue has been about 5 per cent—this disparity resulting from the fulfillment of promise to improve service over all lines at all hours of the day.

The Public Service Commission and other regulatory bodies set the standard for service in Kansas City at 640 cars as of July, 1917; the company is now operating 720 cars.

The justice and logic of the railway company's position regarding jitneys are being recognized more clearly as time passes. The company had not been fighting the jitneys as direct competitors, it had not sought or asked their complete elimination. The company had suggested that jitneys constitute a subsidiary transportation facility. The railway contended that the jitney,

being a supplementary service, should be so operated as to fulfill its function for the public benefit to the best advantage. It should be required to build its prestige and business independently, in the service to which it was best adapted and most useful, and not to secure its business directly from the railway sources of business, nor in direct competition with the railway. The company did not agitate against jitneys, nor use publicity to put jitneys in bad repute.

Before the regulatory ordinance became effective, many citizens seemed to consider that the city officials were about to destroy the jitney service, from motives of hostility. The Council and the city officials patiently bore the criticism. It is said that the receivers,

representing the public as well as the company, were able to present the matter effectively to the city officials.

About fifty jitneys discontinued operations immediately upon the ordinance becoming effective. Many others, while operating on the prescribed routes, are not maintaining schedules in non-rush hours. Even in rush hours, the schedules of the jitneys are not always followed.

The regulatory ordinance was attacked by jitney operators, and a temporary injunction secured against its enforcement. Upon final hearing, Judge Hall of the Circuit Court of Jackson County, at Independence, Mo., declined to make the injunction permanent. The jitney organization has appealed to the Supreme Court from Judge Hall's decision. Judge Hall concluded his finding with these words:

The streets of the city, under the statutes, belong to the city and are exclusively under its control. No one can use the streets for any public purpose, like the transportation of passengers for hire, without the city's consent—neither a railway company, nor a jitney owner, nor anyone else.

Communities Back Fare Increase

Suggestive Ideas Are Contained in Rate Appeal to Which Railway Won the Support of Communities Affected

Passenger rates were increased on April 20 by the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., pursuant to an order issued by the Public Service Commission of Missouri on April 2. The increase was 25 per cent. It applies to commutation as well as other passenger rates. The remarkably small amount of "legal proceedings" involved in securing the adjustment constitutes an interesting phase of the event.

THE application, evidence, opposition and support regarding the increased rate were all presented in a frank, business-like and "uncontroversial" manner. All the cards were laid on the table by both sides, with the result that there was no contention against the rate increase as a whole. The only opposition to the application appeared in the form of a request that additional elements of service be installed—elements which the company had planned and was ready to establish.

As the proceedings developed, the minor items of controversy as to rates and service were adjusted by representatives of the different communities on the basis of more equitable distribution of a recognized higher cost of operation than was provided for under the old rate.

Preliminary to making the application for the increase Robert P. Woods, vice-president and general manager of the railway, discussed with officials of communities served the road's service and the approaching necessity for improvements. A careful survey was also made of opinion as to the road's service as viewed by the communities, and public officials were reminded of the expenditures that must soon be made. The attorneys for the communities in any proceeding regarding rates were shown data as to costs of maintenance and operation and of net revenue, and were invited to examine the company's

records. The exhibits upon which the company was going to base its application for an increase were shown in advance of the hearing and convinced the officials that higher rates were necessary if their communities were to receive a continuance of the service.

As a result of these conferences each community, recognizing the need of the higher rate, bent its efforts to "protecting its rights," so that its service would not suffer, and it would not bear a disproportionate part of any increase.

Mr. Woods prepared the application himself—going to the heart of the matter. Seventeen exhibits showing valuation and operation data were also prepared and presented by him. The application as he wrote it contained scarcely 1,000 words. Four short paragraphs gave the data on the history of the company and its passenger rates. One paragraph asked straightforwardly for a 2½-cent rate (a 25 per cent increase), commutation rates to be advanced in the same proportion. Another paragraph gave the reasons for the request—that the company had charged only 2 cents a mile for seven years; that this rate had been inadequate for several years; that costs had risen greatly in the period; that all surplus had been put back into the road, and that heavy expenditures would have to be made to keep the property in first-class condition. The application was filed on Feb. 25.

A statement prepared by Allen G. Hoyt, president of the company, representing the general subject of electric line rates, was filed separately, in support of the brief application.

ONLY ONE HEARING HELD

One hearing was held by the commission. This was conducted at Kansas City on March 11. Five witnesses testified in behalf of the application—Mr. Woods and four bankers. The bankers were called to testify as to the rate of return proper for an electric railway. Colonel C. F. Enright, former bank commissioner of Missouri, one of these witnesses, said the rate of return should be not less than 8 per cent; W. P. Fulkerson, banker, St. Joseph, Mo., testified that he would not want to invest in applicant's property on an 8 per cent basis because he could do better with other securities. W. T. Kemper, chairman of the board of the Commerce Trust Company, the largest bank west of Chicago, testified that nothing less than 8 per cent would be a reasonable return and that he did not expect interest rates to decline during the next few years. Mr. Hoyt, vice-president of the National City Company, New York, said that electric light and power securities, the most attractive in the public utility field, are selling to net more than 8 per cent, and that returns on electric railways, not in great public demand, should be materially above 8 per cent. There was no testimony or argument against the 8 per cent minimum return. No further evidence or testimony was presented by the company.

The "protests" regarding the application did not in any instance attack the principle of an increase, nor question either the exhibits of the company or the conclusions drawn by the company from these exhibits. Rather were the arguments by representatives of communities confined to an effort to attain an equitable distribution of the cost of operation among the communities.

COMPANY NOT INTERESTED IN METHODS

One community, for instance, sought to secure retention of its former commutation rates, and another, which had not had such commutation rates, claimed discrimination. Other communities responded that it would not be fair to require through traffic to bear a disproportionate rate for the special benefit of an intermediate station. The company made it plain that "if the commission will provide us adequate means for carrying on the necessities we have outlined, we do not care how the commission arranges the details, and as long as there is commutation rate in one place, we don't know why there should be discrimination." As a result further suggestions were made by the communities themselves toward equalizing both rates and service over the company's lines.

Incidental to the rate hearing—as

an element in the costs of operation and ability to increase service under higher rates—various communities asked improvements. As a compromise among the communities, a limited train was agreed upon for Excelsior Springs which should make one stop, at Liberty. This item of increased service, together with the commutation rate asked for Excelsior Springs, was included in the order of the commission.

The order, issued on April 2, increased passenger rates from 2 to 2½ cents a mile; increased existing commutation rates of 1.3 cents a mile to 1.625 cents a mile (the same proportion, 65 per cent, of the regular rate as before).

In reviewing the exhibits and testimony the commission pointed out that the increase of 25 per cent to 2½ cents per mile, if granted, would provide a return for all purposes in excess of 8 per cent—as the figures indicated 8.2 per cent. The commission stated, however, that this rate of return might be reduced in fact through the establishment of the commutation rates and other items of service not previously among the expenses.

The new rates went into effect on April 20 without any objection having developed over the matter or complaint being heard.

The whole proceeding reflects a gratifying co-operation of the public with company and commission for the attainment of maximum permanent service from the utility. The representatives of the communities seem to have sought such results concerning rates and orders on other subjects as would bring about the most satisfactory operation of the railway for the interests of all concerned.

Five-Cent Fare Re-established

Keokuk, Ia., went back to a 5-cent fare the early part of April of this year under its original franchise ordinance which has about ten years to run. The validity of such franchise contract was a point involved in the case presented to the Supreme Court of Iowa in the suit of the Ottumwa Street Railway against the city of Ottumwa. A decision was made at that time holding that such a clause was not binding on the railway, and pending a decision on rehearing, the City Council of Keokuk, last December, granted the Keokuk Electric Company an increase to 7 cents. Rebate slips were issued, to be redeemed if 5-cent fares were established. Apparently with the belief that the convening of the Iowa Legislature would probably result in the introduction and passage of measures of relief for the utilities and that the new court which came in on Jan. 1 might reverse the court's former decision the Ottumwa Railway applied to the Supreme Court to dismiss the appeal. This was granted and as a result the City Council of Keokuk rescinded its action in regard to the 7-cent fare and ordered the company to cash the rebate slips and re-establish the 5-cent fare.

Rehearing on Fort Wayne Fares

Robert M. Feustel, president of the Indiana Service Corporation, Fort Wayne, Ind., states the company will not oppose the rehearing on the city's petition to secure a reduction in rates. This rehearing was recently granted by the Indiana Public Service Commission. The present fare is 7 cents, four tickets for a quarter. The city is seeking a 6-cent rate, nine tickets for 50 cents. Mr. Feustel says:

In presenting the case before the commission, the city estimated that the minimum increase in passengers hauled in 1921 over 1920 would be 500,000 and that the probable increase would be 2,000,000 passengers. Up to date this year there has already been a decrease of more than 500,000 passengers below the figure for the same period last year.

In his statement giving the reasons for asking for a rehearing the city attorney alludes as follows to the matter of maintenance:

The city of Fort Wayne is desirous that proper service be maintained, but it believes it unjust to do an abnormal amount of maintenance work, rebuilding of lines and such in a very short time, thus taxing the present car riders more than their just burden, to satisfy the desire of the present operator to get his Fort Wayne lines in the very best possible condition at the earliest possible moment.

Hartford Indorses One-Man Car

The Common Council of Hartford, Conn., on April 25 authorized the Connecticut Company to operate one-man cars in the city indefinitely. A resolution was adopted suspending for an indefinite period that portion of the Tucker agreement, so called, of 1894, providing that there must be a crew of two men on each car. The Connecticut Company's petition, embodied in the resolution as adopted, asked that the restriction be lifted "until such time as the proper authority of the city of Hartford shall notify the Connecticut Company six months in advance of its desire to cancel such suspension."

Except for this action by the Council, the Connecticut Company would have been compelled to withdraw its one-man cars from lines within the city of Hartford on May 1. By a vote on Sept. 22, 1919, the Council gave permission for the operation of the one-man cars until May 1, 1921, explaining that "the General Assembly of the State may pass legislation concerning electric railways and by that time the electric railway situation in the State may be clarified."

The Aldermen, acting on an unfavorable report from the joint committee, had then refused to authorize the operation of the one-man cars for an indefinite period. The problem was solved, however, when the Council adopted a resolution by which the company was empowered to operate passenger cars with one man as operator within the city limits until May 1, 1921. The resolution provided that "at the expiration of this permission, if no further permission is given, *ipso facto* said provision in said agreement (the Tucker agreement) revives and becomes in full force and effect."

Cleveland Engineers Testify at Trenton Hearing

The Board of Public Utility Commissioners of New Jersey is hearing the application of the Trenton & Mercer County Traction Corporation for an increase in fare from 7 to 10 cents. The commission was asked to grant the 10-cent rate on a temporary basis, and later after considering the valuation of the company make a permanent rate.

Peter Witt, Cleveland, Ohio, testified that the company was being saved from financial ruin through the Trenton City Commission withholding its approval of jitney operations. Mr. Witt favored a 5-cent fare between the hours of 8 a.m. and 4.30 p.m., with seven tickets for 49 cents or 10 cents cash during the rush hours. Mr. Witt said that the large two-man cars could be operated as one-man cars, and that he was opposed to jitneys because the burden of taxes was placed on the railway.

Charles H. Clark and Lawrence P. Crecelius, Cleveland, undertook the construction of a theoretical trolley line, competing with the Trenton Company. They said that such a line could be built more economically than the Trenton line. Mr. Crecelius said the company was losing money in supplying power for the cars from the Trenton power house on Lincoln Avenue. He suggested three substations for the distribution of power purchased from some other company. Mr. Clark said that the company's power plant was about 75 per cent efficient.

Victor B. Phillips, Cleveland, was a witness at the hearing on May 10.

Use of One-Man Cars Upheld

The bill introduced in the Massachusetts Legislature to prohibit the operation of one-man cars has been "given leave to withdraw." This bill was fostered by the street cartmen's unions and was strongly backed by the American Federation of Labor. At numerous public hearings every conceivable argument was brought up in support of this proposed legislation against the principle of one-man car operation. The strongest line of attack was on the ground of alleged danger to the public.

While refuting these charges of danger to the public, the railways made the weight of their case on the legitimate economy of the principle of one-man operation, and demonstrated conclusively to the legislators that had it not been for one-man cars many more miles of railway track would have been added to the already large abandonments in that state. Several managers showed that the passage of any anti-one-man car bill would result in the immediate suspension of service on many lines.

The failure of the labor interests to convince the Legislature of the existence of any alleged danger to the public is especially significant, because in Massachusetts hundreds of former two-man cars, double as well as single-truck, have been converted to one-man

operation without any of the usual standard manufactured safety devices. The Massachusetts Department of Public Utilities requires only that some well-constructed device be installed accessible to passengers which will permit anyone inside the car to apply the brakes and unlock the doors in an emergency.

Be Wise and Advertise!

The Mitten management is "talking to the public" through the medium of advertisements in the Philadelphia *Public Ledger*. Emphasizing the fact that it deservedly has the support and confidence of the 10,000 employees of the Philadelphia Rapid Transit, it desires similar co-operation on the part of the public.

One of these advertisements says that fifty-two separate companies were originally started to operate street cars in Philadelphia, and each one was authorized to collect a separate fare. The roads were all gradually brought together in order to make possible one

Only 3 per Cent of Boston Traffic Pays Five-Cent Fare

Edward Dana, general manager of the Boston (Mass.) Elevated Railway, testifying before the New Jersey Board of Public Utilities, in the fare case of the Public Service Railway, outlined the policies of the Boston trustees and the results of their experiments with reduced fares.

Local riding has increased approximately 78 per cent on the Malden and Everett lines of the company, where a 5-cent fare for short hauls has recently been instituted. This is an experimental service instituted by the trustees for the purpose of endeavoring to regain the short-haul traffic lost since 1917 by the various increases in fares from the original 5-cent rate to the present 10-cent fare.

The decrease in total revenue passengers since 1917 has been 40,000,000, or about 12 per cent, according to Mr. Dana's testimony. The theory of the management, he explained, is that this loss took place not in the regular daily

Mitten Management Talks to the Public

Investment and Return of P. R. T. and Underlying Companies

	Capital Paid In	Mortgages Bonds, Etc.	Total Paid In	Rentals and Dividends	Interest Etc.	Total Return	Percent Per Annum
As at June 30, 1903	\$58,611,380	\$ 9,373,569	\$ 67,984,949	\$6,429,446	\$ 670,016	\$ 7,099,464	10.44
" " " 1904	64,596,060	9,315,444	73,911,504	6,429,321	671,412	7,100,733	9.61
" " " 1905	67,583,700	10,394,278	77,977,978	6,729,341	713,634	7,442,975	9.54
" " " 1906	68,461,440	20,416,611	88,878,051	6,729,438	1,106,584	7,836,022	8.82
" " " 1907	77,243,520	21,260,794	98,504,314	7,039,026	1,142,123	8,181,149	8.30
" " " 1908	81,909,532	21,207,372	103,116,904	7,047,651	1,141,556	8,189,207	7.94
" " " 1909	86,436,055	24,875,039	111,311,094	7,347,661	1,214,203	8,561,864	7.69
" " " 1910	86,436,055	26,019,039	112,455,094	7,356,786	1,377,468	8,734,254	7.73
" " " 1911	86,438,500	27,659,019	114,097,519	7,358,342	1,429,026	8,787,368	7.70
" " " 1912	86,438,500	29,432,019	115,870,519	7,365,960	1,460,387	8,826,367	7.62
" " " 1913	86,440,255	33,945,317	120,385,572	7,364,939	1,640,345	9,005,284	7.48
" " " 1914	86,440,255	39,167,817	125,608,072	7,364,635	2,008,192	9,372,827	7.46
" " " 1915	86,440,255	41,052,811	127,493,066	7,364,957	2,089,759	9,454,756	7.42
" " " 1916	86,440,255	40,594,811	127,035,066	7,964,443	2,139,062	10,103,505	7.95
" " " 1917	86,452,965	39,760,811	126,213,776	8,864,670	2,108,346	10,973,016	8.69
" " " 1918	86,453,040	39,142,811	125,595,851	8,865,181	2,097,999	10,963,180	8.73
" " " 1919	86,453,040	42,653,867	129,106,907	8,863,206	2,251,736	11,114,942	8.61
" " " 1920	86,453,040	42,841,819	129,294,859	7,366,490	2,336,620	9,703,110	7.50

\$30,000,000 of this money, paid in by P.R.T., made possible the building of the Market Street "L," which the Philadelphia Real Estate Board says has more than doubled values of adjacent real estate in West Philadelphia. The real estate owners, by increased values, and the City of Philadelphia, by increased taxes, have benefited from the building of the Market Street "L" much more than the P.R.T. stockholder.

The increase in city assessments proves that \$129,294,859, if invested in city real estate during this period, would have brought much greater returns to the investor.

What inducement can be offered the investing public to secure from them the new money now required for further transit development?

No. 1

PHILADELPHIA RAPID TRANSIT COMPANY
T. E. Mitten, President.

PHILADELPHIANS ARE INFORMED OF MITTEN MANAGEMENT
BY THIS TYPE OF AD

big operating company which would carry a passenger throughout the city for a single fare. Under these conditions the company is anxious to co-operate with the people to the end of supplying a car service of which they will have every reason to be proud and which will meet the ever-expanding need of the city.

"President Mitten's new departure in inaugurating a series of talks to the public on the problems, purposes, and hopes of the Philadelphia Rapid Transit Company is an excellent one," says the *Public Ledger* editorially, "and there is nothing more surely calculated to inspire confidence and insure co-operation than a frank understanding between the public utility and the public served by it. If, therefore, Mr. Mitten shall persevere in his announced intention to tell the plain facts about transit matters, he will perform a service to the corporation he serves so well."

tidal traffic from the suburbs to the business center, but rather in the local rides in outlying communities; also possibly to some extent people living within the mile and a half zone from the center have been walking since the advent of higher fares. It is with the desire to regain some of this short-haul traffic without infringing on the revenue received from the regular 10-cent fare traffic that the trustees are trying out various 5-cent fare lines.

At present, he stated, 2.9 per cent of the total revenue passenger traffic of the system is being carried for a 5-cent fare, the balance all paying 10-cent fares. The 78 per cent increase in local riding in Malden and Everett is considered encouraging, but it must be further increased to 100 per cent to equal the revenue received from the local 10-cent fares before the 5-cent fare went into effect. Mr. Dana also said that the failure of the town au-

thorities of Malden to aid in removing a competing jitney line may cause the abandonment of the experiment in that locality. They have also found, he said, that the three short 5-cent lines operating into the business district of Boston are doing a large business, with car mile earnings above the average for the system, but they have also taken traffic from the 10-cent lines.

Jersey Argument Closed

The appeal of the Public Service Railway, Newark, N. J., for a 10-cent fare is now formally before the Board of Public Utility Commissioners of that State. Concluding argument by counsel was made at Newark on May 5.

George L. Record, special counsel for Jersey City in charge of the case for the municipalities, charged the company with operating inefficiently. This was the basis of his whole argument.

Edmund W. Wakelee, counsel for the company, said that the 10-cent fare was the only rate that could afford adequate relief. It was difficult, according to him, to argue a case where there was so little to argue about. He said in conclusion:

The statements and estimates of the company are not in dispute. The controlling principles of law are fixed and certain. That relief is necessary is incontrovertible, and the 10-cent rate is the only rate that can afford adequate relief. The company, therefore, confidently appeals to this board to dispose of this pending application in such a manner as to meet this critical situation and to effect substantial justice so far as it is possible to do so.

New Orleans Hearing Delayed

After a conference between State Attorney-General A. V. Coco and H. Generes Dufour, representing the New Orleans Railway, a motion was made by the Attorney-General for a continuance on the hearing of the application of the New Orleans Railway & Light Company for an injunction restraining the state from beginning legal proceedings against enforcement of the 8-cent fare. Judge Foster, of the Federal District Court, granted the continuance asked for till May 16, but upheld the temporary restraining order.

Announcement is made that the city of New Orleans will delay its answer to the injunction proceedings instituted against it by the receiver of the New Orleans Railway & Light Company until after the adjournment of the Constitutional convention. It will be recalled that there is now pending in the Federal Court an order restraining the city from interfering with the receiver in the collection of an 8-cent fare.

In the order of Judge Clayton, who issued a temporary injunction upon the request of the receiver, the city had twenty days from April 21 within which to file an answer.

City Attorney Kittredge is a delegate to the Constitutional Convention now in session and postponement was asked for by him after a conference had with H. Generes Dufour, counsel for the receiver. This action will, of course, delay the hearing thirty days.

Transportation News Notes

Interurban Fare Rise.—Passenger fare rates on the Fort Wayne, Van West & Lima Traction Company, operating between Lima, Ohio, and Fort Wayne, Ind., will be increased 10 per cent beginning June 1.

Beeler Rerouting in Effect.—Rerouting under the Beeler plan was begun on the system of the Kansas City (Mo.) Railways on May 1. The ordinance providing for the readjustment had been passed by the City Council, and was approved by the Public Service Commission, with little controversy or opposition. In the first few days of operation of the lines on which rerouting was begun there was no complaint, and there was the expected improvement in efficiency and economy. Rerouting will probably cover a period of several months.

Coach Company Says "Thank You."—The Fifth Avenue Coach Company, New York, N. Y., recently published its "Thank You" to the public in appreciation for various letters of commendation received from its patrons. The letters, some of which are reprinted in this pamphlet, relate a real experience with a courteous conductor or with a skillful driver. A practical example of recognition for accommodating service on the part of its employees is shown in the company's recent announcement of an increase in pay which the men will hereafter receive.

Wants Two-Cent Transfer Charge.—The increase in fare to 6 cents, with twenty tickets for a dollar and a 1-cent transfer charge, is not helping the financial condition of the Indianapolis Street Railway, its officials say, and when the thirty-day probation period has been completed on May 18 and the company again appears before the Indiana Public Service Commission it will ask for an additional 1-cent transfer charge. The general industrial depression, with its consequent unemployment, has decreased the number of passengers riding the cars daily to such an extent that the increase in rates is not holding the company even. Last year an average daily haulage was about 300,000 passengers. This year there are many days when less than 250,000 are riding. The company will ask authority to charge 6 cents, with twenty tickets for a dollar and 2 cents for a transfer.

Jitneys Use Metal Tickets.—The Milwaukee Bonded Carriers' Association, an organization of jitney men operating in Milwaukee, Wis., has recently commenced selling aluminum fare checks at the rate of seven for 50 cents. Checks purchased from any of the operators will be good for one ride

on any jitney run by a member of the association. The new rate will be a reduction of 1 cent from the old jitney cash rate of 8 cents. The new cash rate will, however, be 10 cents. The railway rate is 7 cents cash, or eight tickets for 50 cents. Jitney operation in Milwaukee is regulated by state law and is under the supervision of the Wisconsin Railroad Commission. Permission must be obtained from the commission before a jitney can be operated in Milwaukee, and even after such permission has been obtained the commission continues to supervise the operation and sees that the routes assigned to an operator are adhered to and that he follows its regulations in other ways.

A Practical Application of Selling Transportation.—The Georgia Railway & Power Company, Atlanta, Ga., has capitalized some of the ideas expressed by President Arkwright in his recent address, "Don't Hate Your Customers," which was printed in the *ELECTRIC RAILWAY JOURNAL* for April 23, 1921. Two cardholders are to be installed in each car reading: "This car in charge of Conductor — and Motorman —." Each trainman will be furnished a slide bearing his name, which is to be inserted in the holder while he is on duty so that his customers may become familiar with his name and address him by it. The company is also endeavoring to teach the men the advantages of doing business in a way that tends to introduce a little personality and urges the men to greet their customers with a good morning or good evening as the case may be when they board their car. While the company does not make this the subject of a general order it is suggested to improve the standard of work.

Sustains Seven-Cent Fare.—The Pennsylvania Public Service Commission has refused the application of the Pennsylvania-Ohio Electric Company for permission to charge a 10-cent fare in New Castle, and has ordered a continuation of the 7-cent cash fare with six tickets for 40 cents and twenty tickets for a dollar with free transfers. The Sharon & New Castle Street Railway, which operates the local railway in New Castle, recently filed a new tariff of rates with the commission. The commission believes in a community like New Castle where there are many "short-haul" riders it would be a mistake to put a straight 10-cent cash fare into effect. The commission says in the event of an advance in the cash fare the short riders would be the ones to refrain from using the cars, and the company, in order to obtain the maximum amount of revenue and render the public service it is under obligation to perform, should make every effort to retain its short riders. It is also said "the policy of seeking to obtain a given amount of revenue by the rendition of service to a reduced number of patrons at a higher rate is not in harmony with proper utility service regulation and is also inimical to the accommodation and convenience of the public."

Personal Mention

Promotion for R. H. Wyatt

Old-Time Operator Becomes Superintendent of Louisville & Interurban Railroad

Richard H. Wyatt, general freight and passenger agent of the Louisville & Interurban Railroad, Louisville, Ky., since 1910, has been promoted to the newly created position of general superintendent of the interurban system, which is a subsidiary of the Louisville Railway. Mr. Wyatt and Samuel Riddle, now vice-president and superintendent of transportation of the Louisville Railway have been handling jointly the work that is now handled by Mr.

dling the reins of a mule team pulling a car on the Twelfth Street line. Subsequently he became a conductor with the advent of electric cars, and later served as railway inspector. He then became transfer agent and afterwards drew an office assignment. For a number of years he was superintendent of the Highland carhouse and has also served as assistant paymaster.

When the interurban group of the Louisville Railway was formed in 1903, Mr. Wyatt became general express agent on the interurban lines. He has been general freight and passenger agent for the seven lines of the interurban system since the Shelbyville and LaGrange divisions were taken over by the Louisville & Interurban Railway in 1910.



R. H. WYATT

Wyatt as general superintendent. The change, which was effective on April 30, marks the close of his thirty-eight years of active service with the Louisville Railway. His recent advancement is one of many promotions he has won in the service of the railway and interurban company.

Mr. Wyatt, who is one of the veterans of the local street railway and interurban service, was originally employed by the late H. H. Littell, who organized the Louisville Railway. The new superintendent has in his possession a much-prized letter, probably the last that Mr. Littell ever wrote. It is in Mr. Littell's own handwriting and is in the nature of a compliment over the promotion which has just come to Mr. Wyatt.

One of Mr. Wyatt's first hard nuts to crack as the new general superintendent was in connection with the adoption of daylight saving by Louisville, commuters favoring a schedule based on daylight saving, while farmers and shippers wanted standard time. A compromise was reached by rearranging the schedule so that now both the time and the service are satisfactory to all.

Mr. Wyatt's connection with the Louisville transportation system dates back to 1883. His first work was han-

E. I. Lewis and J. D. Campbell Picked for I. C. C.

Nominations of E. I. Lewis of Indianapolis, Ind., and James D. Campbell of Spokane, Wash., to the Interstate Commerce Commission, were confirmed without opposition by the Senate on May 3. The nominations were sent to the Senate by President Harding on April 28.

Mr. Campbell, an attorney, has practiced extensively before the Commission in the Intermountain rate cases. Mr. Lewis has for the past four years been chairman of the Indiana Public Utilities Commission. The selection by President Harding of Mr. Lewis was fully expected, but that of Mr. Campbell came as a surprise.

Mr. McCardle Commission Head

John W. McCardle, Indianapolis, Ind., was elected chairman of the Indiana Public Service Commission on May 2. Mr. McCardle was the unanimous selection of the members of the commission. He was nominated for the chairmanship by E. I. Lewis, retiring chairman, who has resigned from the commission to accept a place on the Interstate Commerce Commission. Mr. McCardle has been a member of the commission for four years and was recently reappointed by Governor McCray for a second term. He has been vice-chairman of the commission and is regarded as one of the ablest men who have been connected with the Indiana utilities body. With the reorganization of the commission Lawrence C. Loughry, Monticello, Ind., has taken office as secretary. He succeeds Frank P. Litschert, former secretary of the Governor, who has held the position temporarily following the resignation of Carl H. Mote. He is a graduate of the Indiana University Law School. Carl Wilde succeeded M. D. Atwater as director of service.

Ralph Stickle Resigns

Well-Known Claims Man of Cleveland Railway to Establish Private Law Practice

Ralph Stickle, assistant superintendent of the accident department of the Cleveland (Ohio) Railway, has resigned to enter the private practice of law in Cleveland. His resignation is much regretted by the operators of the road because of the efficient work that he has done in reducing the accident hazard to a minimum.

Particular study has been made by Mr. Stickle of the automobile hazard, how it may be lessened by the railway companies, autoists and public. He presented a paper on this subject before the Claims Association last October in which he stated that it is the business of claims men to try to make transportation men, autoists and the public realize the importance of this problem and to solve it. Little can be done to



RALPH STICKLE

relieve the claims department in handling auto accidents except to prevent accidents. In his agitation for safety he recommends the repeal of antiquated anti-trolley legislation and systematic continuous safety work among employees, besides propaganda directed toward the education of the public. Also a great step forward would be taken if we had uniform traffic laws in every state so that the different kinds of traffic could be segregated.

Mr. Stickle has been with the Cleveland Railway for seven years, having for some time been in charge of the current claim work. He has also been identified actively for several years with the Claims Association and the American Electric Railway Association.

Before taking up the practice of law, Mr. Stickle was a newspaper man. For five years he was the political correspondent at the state capitol at Columbus for the Cleveland News and later was departmental editor on Cleveland newspapers. He is a graduate of Western Reserve University and the Baldwin-Wallace Law School.

Mr. Stickle will be succeeded about May 15 by Joseph S. Kubu, who is now claim agent for the Utica lines of the New York Railways.

Mr. McAneny Selects Working Force of Transit Commission

Actual work on the plan to reorganize the transit system of New York city has been started by the appointment by George McAneny, chairman of the new Transit Commission, of Brigadier-General Lincoln C. Andrews as executive officer, Daniel L. Turner as consulting engineer, and three men who will have charge of the work of evaluating the property of the transit companies. The appraisal engineers named include John H. Madden of Brooklyn, valuation engineer; Frederick W. Lindars, chief accountant; and Major John C. Cooper, assistant chief accountant. Also Captain Edward T. Fitzgerald was named acting chief of the Transit Bureau. Five of the new appointees were connected with the old Public Service Commission before the war.

Brigadier-General Lincoln C. Andrews, who has been selected as executive officer of the Transit Commission recently retired from the army. He will have general charge of the new commission's working organization and will, so far as may be necessary, assign its employees to the several divisions or bureaus and superintend the performance of their duties. General Andrews is a graduate of the United States Military Academy. He saw active service in France in the World War and after the armistice became Assistant Provost Marshal General of the Expeditionary Forces.

Daniel L. Turner, who has been appointed consulting engineer to the commission, since 1916 has served as chief engineer under the Public Service Commission, and since 1919 under the Transit Construction Commission. As such he will be the commission's chief advisory engineering officer.

Mr. Madden, selected for engineering head of the valuation work, was assistant division engineer of the old commission and did valuable work in supervising the construction of the new subway in William Street, where many problems new to engineering practice were encountered and successfully solved.

Frederick W. Lindars, now chief accountant, has been a member of the firm of Banks, Haig & Lindars, expert accountants. He also served in a similar capacity with the commission from 1916 to 1919, and organized the Bureau of Accounting, established by the commission to check the expenditures of the Interborough Rapid Transit Company and the New York Municipal Railway Corporation under the new subway contract.

Major Cooper served with Mr. Lindars under the old commission. He resigned in 1915 to enter the military service. Since the war he has been engaged in private business.

Captain Fitzgerald was with the old commission for several years as railway engineer. He served in the navy throughout the war as captain, rejoining the engineering department of the commission at the close of the war.

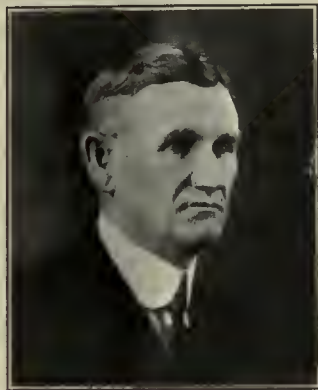
His present assignment will be temporary only, but after he has placed the bureau on a proper footing, he may be used by the commission for similar work in other bureaus.

The fixing of the valuation will be the first move in the program of readjustment and rehabilitation planned by the commission. The work will probably begin this week when the new officials take office.

Mr. McAloney in Atlanta

Well Known Equipment Man Takes Charge of Rolling Stock of Georgia Railways

W. H. McAloney has recently become superintendent of equipment of the Georgia Railway & Power Company, Atlanta, Ga. He will have full charge of shops, carhouses and garage, and will have jurisdiction over maintenance of all street cars and automobile equip-



W. H. McALONEY

ment. The appointment of Mr. McAloney was made by General Manager Butler to fill the vacancy caused by the death of Mr. Moore in 1919.

Mr. McAloney is considered to be one of the leading equipment men in the country. He was for about sixteen years superintendent of rolling stock of the Denver (Col.) Tramway. While there he gained for himself a great many friends and much popularity because of his interest in appliances for the convenience and comfort of the employees. Articles by Mr. McAloney have appeared in the JOURNAL from time to time, dealing particularly with his experiences and suggestions regarding various pieces of railway equipment.

While in Denver he was actively connected with the welfare association of the Denver Tramways. Many times his wise words of admonition to employees were put in the form of maxims. One of these, which was made some years ago and is just as true today, is, "The traveling public is becoming more and more exacting, and the standard of service is continually being raised. Let us try to be faithful, accurate and constant within the limits of commercial error."

Mr. McAloney began work for the

Denver Tramways as a conductor in 1891, and after a few months of this work entered the office of E. W. Olds, at that time master mechanic. Soon afterward he was appointed division superintendent of the East Division and later returned to the shops as storekeeper. In 1902 he became superintendent of rolling stock, the position he held at the time of his resignation in 1918.

In July, 1918, Mr. McAloney was appointed superintendent of rolling stock of the Winnipeg (Man.) Electric Railway. He remained in Winnipeg until 1920, when he became associated with John A. Beeler, consulting engineer.

Mr. McAloney's arrival in Atlanta makes the third Winnipeg man to join the operating staff of the Georgia Railways & Power Company. General Manager Butler not long ago directed the operation of the Winnipeg Electric Railway and J. R. Ong, whose appointment to the position as transportation engineer in Atlanta was made known in the April 9 issue of the JOURNAL, held the same title in Winnipeg.

Walter C. Strunk has resigned from the mechanical research and construction division of the Interborough Rapid Transit Company motive power department to enter the service of the Westinghouse Electric & Manufacturing Company, Chester, Pa. Mr. Strunk, after his graduation from Swarthmore College in 1909, immediately entered the Metropolitan Street Railway Company Training School. Two years later he entered the electrical department, and in 1912, when the New York Railways Company was organized, he became assistant engineer in the motive power department of the Interborough Rapid Transit Company and New York Railways Company. His work up to 1917 was in the Economics Division, since which time he has been in charge of all tests and experimental work in connection with mechanical power station equipment.

Edward C. Marshall, Charlotte, N. C., has been elected president of the Southern Public Utility Company by the directors to succeed the late Z. V. Taylor, who died suddenly about a month ago. Mr. Marshall has been treasurer of the company since its organization in 1913, and in that capacity had been the closest associate of Mr. Taylor in the direction and development of the company, his help having been especially valuable in working out the financial problems during the constant expansion and development of its properties. Prior to 1913 he was for a number of years connected in an official capacity with the Southern Power Company, of which the Southern Public Utilities Company is a subsidiary. The latter company operates the street railway, lighting and electric power systems in Charlotte, Winston-Salem, N. J.; Greenville, N. C., and Anderson, S. C., and the power and lighting systems in nearly a dozen other towns in the Carolinas. Its holdings represent an estimated value of about \$20,000,000.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Another Coal Shortage Impending?

Production Is Still Low, Consumers' Stocks Are Decreasing, but More Interest Is Displayed

Despite present light demand for coal and the prevailing promptness of railroad deliveries considerable discussion continues to be heard regarding prospects of another coal shortage this fall and winter. According to the May 12 issue of *Coal Age*, C. H. Markham, president of the Illinois Central Railroad, is advertising in newspapers in the Middle West warning the public of an impending coal shortage because, "as one of the largest coal-carrying roads in the Middle West," he considers it a duty to sound this warning. He plainly states that the country is headed for a serious bituminous coal shortage. At the same time Senator Elkins, in a statement issued from Washington, emphatically declares that a "sudden restoration of the market and an attempt to crowd the hauling of the bulk of the nation's coal into the autumn and winter months will place upon the railroads a burden which they are admittedly unable to discharge adequately."

PRODUCTION HAS INCREASED LATELY

Production of soft coal during the last three weeks of April started an upward climb from the low point of about 6,000,000 tons per week to nearly 7,000,000 tons. This increase in production followed a steady decline in output that began last December, and it must be remembered that even the present rate of operation is still lower than at any time since April, 1914, except for the period of the coal strike in 1919.

Stocks of bituminous coal in the hands of consumers in this country as of April 1, 1921, are estimated at about 37,000,000 tons by the Geological Survey. This represents a decrease of about 8,000,000 tons in the stocks held by consumers on Jan. 1, 1921. As current consumption and exports are doubtless in excess of current production the draft on consumers' stocks still continues.

The contract market remains dormant as quotations are too far above spot coal prices to attract buyers. Producers hold to their prices firmly, however, and refuse to close business on a yearly basis unless granted a figure which assures them some profit. The spot market, on the whole, is perhaps a little more active. A "busy early" campaign to encourage stocking coal has stimulated business in the Middle West, and in New England buyers seem to be getting over their indifference too. There was a distinct revival to the ex-

port market the latter part of April. Throughout the country the decline of consumers' stocks is causing buyers to keep more actively in touch with the market even though they are not taking a heavier volume of coal.

Some purchasers are apparently holding off in the hope of a drop in freight rates. Even if this should materialize in time to care for a considerable tonnage before the expected fall rush may develop, however, it still seems hardly likely that there is prospect of a drop large enough to justify holding back purchases.

Better Sentiment Indicated by Business Conditions

Fewer Failures, Lower Discounts and Easier Money, Lower Prices and Wages, Less Unemployment

It seems apparent that a turn for the better and a change in business sentiment are indicated in some items of general business news. In April the failures showed a falling off for the first time in a great many months. Dun's, Bradstreet's and all of the large banks are now seeing hopeful signs in current business conditions. Federal Reserve Bank discounts are being lowered. This is occasioned by easier money and in turn has the effect of making money still easier, after which building prospects are brighter.

The number of idle freight cars is decreasing — although the decreased number is made up entirely of freight cars, nevertheless, if more coal is being moved, is it not indicative of a belief on the part of industry that greater production is soon due?

Almost all business commodities are now down to a level which, while not in all cases equal to the pre-war level, still is of sufficient lowness to warrant resumption of activities on a fair scale. Steel is down and steel wages with it. The only item that is seen to be up is the item of freight, and pressure is now being brought to bear on that. It would not be unreasonable to expect lower freight rates within sixty days.

Non-employment in April was about the same as in March. Some industries show great lack of employment, but many industries show that non-employment is lessening. The indications are that from now on the numbers of unemployed can be expected to decrease.

There seems to be one answer—that business is now on the beginning of the floodtide. He who waits until the tide is full to cultivate this business will probably find that he has lost the momentum of being carried along on the wave.

Stock Deliveries of Standard Size Gears and Pinions

Buying Is Light, Both for Repairs and New Cars, but Is Expected to Increase Gradually

Manufacturers of railway motor gears and pinions have for some time been completely caught up on orders and at the present time are carrying a considerable quantity of standard sizes in stock. Immediate shipments can therefore be made on these, but where special gear blanks have to be ordered for finishing, deliveries range as long as three weeks to four months. Present production in this field is about on an average of 50 per cent of capacity. Some manufacturers are operating a full force of workmen on half time, others have reduced their shop force and the number of working hours per week in about equal proportion.

Demand for gears and pinions this spring is quite uniformly reported to be much below normal. Customers are existing from hand to mouth and repair orders are placed only as is absolutely necessary. With the period of long deliveries well past there is of course little necessity now for a railway to stock gears and pinions. Orders on behalf of new cars are almost negligible for the reason that car builders are still well stocked with motors purchased last year and motor manufacturers are producing only at about one quarter of their capacity.

REDUCTIONS NOT UNIFORM

Prices in this field are trending downward in view of labor and material reductions. Wages have been cut as much as 15 per cent in some instances, while in others war-time prices still prevail. Consequently the price situation varies among different producers, one, for instance, reducing both gears and pinions about 5 per cent the first of last month, a drop of about 10 per cent from the peak, while another manufacturer has made about a 10 per cent decrease on pinions but has not reduced gear prices. The reason for this, it is stated, is that the cost of raw material on gears has not come down appreciably. With the reduction in steel prices and the cut in wages recently put into effect by the United States Steel Corporation, however, it would not be surprising to see a reflection of this upon gear and pinion quotations before long, especially where labor readjustments have not yet been made.

In general a gradual resumption of business is anticipated in this field the balance of the year, but a fairly brisk demand is not expected to materialize before the fall.

Some Activity in Fare Register Market

Some Decrease Recently in Normal Demand Felt Early This Year—Prices Are Unchanged and Shipments Are Prompt

Sales of fare registers during the first two months of this year, usually a slack period with manufacturers, are reported to have held up well to the standard of a year ago. Recently there has been some falling off in demand, it is true, but the market shapes up well in comparison with other classes of railway equipment when the long life and small cost of the fare register per car is taken into consideration.

Stocks of raw material are large, too much so in some instances. Manufacturers are not overstocked on the finished product but hold a sufficient supply to insure prompt shipments. With the falling off of business noted above, production has been cut down and now is such that a great many more registers could be turned out if necessary, especially where additions to plant have been made.

MATERIAL AND LABOR BOTH DOWN

Wages in this field have generally been reduced from 10 to 20 per cent and further cuts may be made, it is stated, at such time as conditions warrant. Material has come down in cost on an average of 20 to 25 per cent, too. In a representative instance, however, the average price of fare registers in 1920 stood about 75 per cent higher than in 1914, while costs went up approximately 110 per cent during the same period. Therefore though prices in this line have not been reduced, quotations on last year's basis are still lower in proportion to cost than in 1914. If material and labor come down further, however, producers will be in a position to reduce selling prices, it is stated. The cost of renting fare registers, where cars are equipped on that basis, shows no reduction either, since renting prices were maintained throughout the war period without change.

Regarding the general outlook for business in this field, producers are reducing expenditures to the lowest possible level on the expectation that a return to brisk business will not occur for some time to come. Revision of Federal tax laws and the release from wage agreements with railway employees are two things specifically mentioned as needing remedy before the situation will improve.

Small Electrification Projected in Brazil

According to advices from the American Consul at Rio de Janeiro, Brazil, part of the railroad at the Itabira de Matto Dentro iron mines will be electrified in conjunction with the project for electrical equipment of those mines, for which a hydro-electric plant will be installed on the Piracicaba River, in the State of Minas Geraes.

Rolling Stock

The City of New York, N. Y., through an appropriation of \$56,000 granted on May 6, has authorized Grover A. Whalen, Commissioner of Plants and Structures, to purchase trackless trolley cars to be placed in operation on Staten Island within the next sixty days. Eight cars will be operated over two routes, one from Meier's Corner to Linoleumville, a distance of 2½ miles, and the other from Manor Road to Seaview Hospital, a distance of 4 miles.

The Monongahela Valley Traction Company, Fairmont, W. Va., has recently purchased a new 50-ton Class B Baldwin-Westinghouse locomotive, a duplicate of locomotive No. 2,000, installed about two years ago, to handle carload and package freight business. It is equipped with four type 562-D-5, 100-hp., 600-volt, field control motors and double-end HL control. It will be used for general utility haulage as this company does extensive business on a steam railroad basis of operation. The general characteristics of this locomotive are as follows:

Weight	50 tons
Maximum tractive effort (25 per cent adhesion)	25,000 lb.
Normal tractive effort at 9.7 m.p.h. (full field 1 hour)	15,200 lb.
Continuous tractive effort with forced ventilation (short field)	9,000 lb.
Maximum trailing load starting on 3 per cent grade	860 tons
Balancing speed (short field at 600 volts) on level with 500-ton trailing load	17.5 m.p.h.
Balancing speed (short field at 600 volts) on 3 per cent grade with 200-ton trailing load	10.5 m.p.h.

The United Railways and Electric Company of Baltimore, Md., mentioned in last week's issue as placing an order for ten safety cars, has issued the following information and specifications on these cars:

Number of cars ordered	Ten
Date of order	April 25, 1921
Delivery	Sixty working days
Builder	The J. G. Brill Company
Type of car	Safety; double door
Weight, total	17,000 lb.
Length	31 ft. 1 in.
Truck wheelbase	8 ft. 0 in.
Width	7 ft. 10½ in.
Height, rail to roof boards	9 ft. 10½ in.
Body	Steel
Interior trim	Cherry
Roof	Arch
Air brakes	Westinghouse
Bumpers	Three-inch channel
Car signal system	Faraday
Control	Safety Car Devices Company
Curtain fixtures	National Lock Washer
Curtain material	Pantasote
Designation signs	Hunter
Door operating mechanism	Safety Car Devices Company
Fare boxes	Johnson
Fenders or wheelguards	H. B. wheelguards
Gears and pinions	Nuttall, helical
Hand brakes	Peacock
Heater equipment	Consolidated Car Heating Company
Headlights	Dayton Mfg. Company
Journal boxes	Brill
Motors, type and number	Two Westinghouse 508, inside hung
Registers	International R7
Sanders	Ohio Brass Company
Sash fixtures	Brill
Seats	Brill
Seating material	Wood slats
Slack adjuster	Gould
Trolley catchers or retrievers	"Q" P" catchers
Trolley base	U. S. No. 6
Trucks	Brill
Ventilators	Brill
Wheel (type and size)	26-in. rolled steel

Youngstown (Ohio) & Suburban Railway Company has recently placed in service a standard class B, 45 ton, Baldwin-Westinghouse locomotive. It is equipped with four type 562-D 5, 600-volt, 100-hp., field-control motors and HLF control. The new locomotive is required to handle the increase in the company's car load freight business.

Franchises

Linnton, Ore.—The City Council of Portland has assured residents of Linnton, a suburb of Portland long without car service, that a franchise will be granted for a railway to that district if the promoters of the proposed line give the city assurance that they will carry the project to completion. An application for a franchise for a line from Linnton to Portland was filed with the Council by J. B. Shaefer and others and was referred to City Attorney Grant with instructions that a franchise with clauses safeguarding the public be prepared and brought before the City Council. Before a franchise can be granted it must be advertised for a period of 60 days. The promoters of the proposed line have obtained a franchise from the County Board of Commissioners for the construction of the line from Linnton to Oilton, a distance of three miles. It is proposed to operate over the lines of the United Railway from Oilton to Twelfth and Burnside Streets, under a common-user clause. The city is asked to grant the franchise from the city limits to Twelfth and Burnside.

Track and Roadway

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The San Francisco-Oakland Terminal Railways has applied to the city for permission to double-track their line on Park Boulevard, a distance of one-half mile.

Toronto, Can.—No contracts for track reconstruction in Toronto will be let until after the commission takes over the railway system in September next. The commission has decided not to change the existing gage which is 4 ft. 11 in., against the standard 4 ft. 8½ in. of the radials, owing to the tremendous expense this change would incur.

British Columbia Electric Railway, Vancouver, Can.—The British Columbia Electric Railway has started work on the relaying of tracks on Government Street, Victoria.

Los Angeles (Cal.) Railway.—The Los Angeles Railway has started improving Maple Avenue. The track will be reconstructed with new 116-lb. girder rails between Washington and Thirty-second Streets and on Thirty-second Street between Santa Barbara and Wall.

Worcester (Mass.) Consolidated Street Railway.—The Worcester Consolidated Street Railway is planning track repair work on Millbury Street and on

South Main Street. According to the general manager there are other improvements which the company would like to undertake and which would cost about \$300,000, but unless receipts warrant it these improvements will have to be deferred.

Morris County Traction Company, Morristown, N. J.—The Morris County Traction Company will relay the tracks in Wharton. The Morris County Freeholders will help relay the tracks and pave the street and charge the costs to the traction company, collecting it at the rate of \$10,000 a year. The work will cost about \$40,000.

Dayton & Troy Electric Railway, Dayton, Ohio.—It is expected that the Dayton & Troy Electric Railway will lay heavier rails through Troy, Ohio, in which event the entire track will be torn up and the right of way repaved with brick.

Portland Railway, Light & Power Company, Portland, Ore.—The Portland Railway, Light & Power Company is planning to start extensive work on repairs of its tracks on First Street. Approximately \$36,000 will be spent on First Street, including the reconstruction of considerable trackage.

Portland Railway, Light & Power Company, Portland, Ore.—The Portland Railway, Light & Power Company is planning extensive improvements on its interurban lines during the current year. The items include contract for the replacing of more than 50,000 ties, repairing of pavement on Oregon City, new station facilities on the Oregon City line at Oak Grove, maintenance work on bridges and trestle. It has been announced that the outlay will be about \$200,000.

Pittsburgh (Pa.) Railways.—The Public Service Commission of Pennsylvania has abolished four grade crossings on the Pittsburgh & Charleroi Street Railway operated by the Pittsburgh Railways.

Saskatoon (Sask.) Municipal Railway.—Tenders addressed to the city commissioners, Saskatoon, were received until May 2, 1921, for approximately 5,000 ties for the Saskatoon Municipal Railway.

Houston, Bay Shore & Texas City Interurban Railway, Houston, Tex.—Construction work on the Houston, Bay Shore & Texas City Interurban line began about April 25, according to an announcement by E. Kennedy of Houston, Texas, president of the line. The first unit of the line to be built, Mr. Kennedy said, would be the section beginning at Main Street, Houston, and extending to the San Jacinto Battleground, a distance of 18 miles down the Buffalo River. It is estimated that this section can be built at a cost of \$25,000 a mile, although Mr. Kennedy said some bids received were as low as \$23,000 a mile. This railway was organized several months ago.

Utah-Idaho Central Railroad, Ogden, Utah.—Although proposed extensions of the Utah-Idaho Central Railroad

from Preston, Idaho to Grace, Idaho, and possibly to Bancroft, have been urged by citizens of those cities, plans for the extension will not be considered until possibly next year, according to officials of the company. However, it is expected that steps to improve the road and to extend the lines to Grace and Bancroft, and possibly to Pocatello, will be taken in another year.

Trade Notes

Automatic Ventilator Company, New York City, manufacturer of car ventilators, has removed its offices to 25 West Broadway.

C. H. Wheeler Manufacturing Company, manufacturer of condensers, pumps, water cooling apparatus, etc., announces the removal of its New York City office to 50 Church Street.

Electrocar Corporation, 501 Fifth Avenue, New York City is the new name of the Berg Electric Car Company, which plans to manufacture buses for use in conjunction with electric railway systems.

The Electric Motor Repair Company, 627 Myrick Building, Springfield, Mass., has established a separate brush department in its organization and will henceforth market its carbon brushes under the trade name "Mohawk carbon brushes."

The Ross Heater & Mfg. Company, Inc., Buffalo, N. Y., announces the opening of a branch office in the New York City district, at 2 Rector Street, its sales agency being discontinued. C. M. Hardin, formerly located at the home office, will be in charge.

Gold Car Heating & Lighting Company, announces the removal of its offices and warehouse on May 1 to Bush Terminal, 220 Thirty-Sixth Street, Brooklyn, N. Y. The company will now have much larger quarters and greater facilities for handling large orders.

Signal Transformers for Melbourne.—The Victorian Railway Commissioners, Spencer Street, Melbourne, Australia, will receive tenders until June 15 for fifty oil-immersed, single-phase track and signal transformers for power signalling (contract No. 33,901).

The Michigan Stamping Company, having absorbed the Toledo Metal Products Company, has moved from Toledo to Detroit, where it will be located at Mack Avenue and Terminal Railroad. Greatly increased manufacturing space will be afforded for production of the company's line of stamped steel outlet boxes.

The Power Specialty Company, New York City, manufacturer of superheaters, economizers and oil stills, has opened new offices in Kansas City, Mo., 512 Reliance Building and in Dallas, Tex., 627 Linz Building. The Kansas City office is in charge of William F. Meyer, who for the last two years has been attached to the Chicago sales office. The Dallas office is in charge of M. W. Brown.

The Peerless Equipment Company, Hanover, Pa., has purchased the entire business of the Electrical Manufacturers' Equipment Company, Chicago. This includes the manufacturing and selling of "Segur" coil-winding tools and allied equipment. This line will be combined with the line of "Peerless" armature repair tools, which business has recently been purchased by the Peerless company from the Manley Manufacturing Company, York, Pa. The Electric Service Supplies Company will continue to act as exclusive selling agents for the Peerless Equipment Company.

New Advertising Literature

Cranes.—The Universal Crane Company, Cleveland, is distributing bulletin No. 11, describing the Universal cranes.

Transformers.—Bulletin 2005 describes "Pittsburgh Power Transformers" of the Pittsburgh Transformer Company, Pittsburgh.

Oil Engines.—The Anderson Foundry & Machine Company, Anderson, Ind., is distributing a folder describing its type "K" Anderson oil engines.

Insulators.—The Hopewell Insulation & Manufacturing Company, Hopewell, Va., has recently published catalog No. 1, covering its types of insulators.

Evaporators.—The Griscom-Russell Company, 90 West Street, New York City, is distributing bulletin No. 330, the Reilly self-scaling evaporator.

Coin Counters.—The C. J. Root Company, Bristol, Conn., has compiled a book, "The Census Takers of Industry," descriptive of coin-counting operations.

Electric Hoists.—The Sprague Electric Works of the General Electric Company, 527 West Thirty-fourth Street, New York City, have issued bulletin No. 48,967.

Lubrication.—"Turbine Lubrication," Part 2, is the subject of the leading article in the April, 1921, issue of *Lubrication* published by the Texas Company, 17 Battery Place, New York City.

Turbo-Generator Sets.—"Turbo-Generator Sets" is the title of bulletin No. 28 recently issued by the Ridgway Dynamo & Engine Company, Ridgway, Pa., in which it describes the latest improvements, including its pneumatic governor.

Oil-Heating Apparatus.—The Power Specialty Company, New York City, has published a forty-page bulletin on the results of investigations on the requirements of oil-heating apparatus with a view to developing a more efficient type of still.

Stokers.—The Combustion Engineering Corporation, 43 Broad Street, New York, has issued bulletin C-2, describing the Coxe stoker. The company is also distributing two pamphlets, one entitled "Use of Pulverized Coal Under Central Station Boilers" and the other "Powdered Coal Application to Four 2640-Hp. Boilers."

Why your Safety Cars should have The Peacock Staffless Brake

The Peacock Staffless

**Develops the MOST
Braking Power
—From the LEAST
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A motorman applying 50 lbs. on a 16-inch wheel develops a **brake rod pull** of 1,066 pounds.

On a 20-inch wheel—1,333 pounds.

Applying 75 lbs. on a 16-inch wheel gives 1,600 pounds.

Applying 75 lbs. on a 20-inch wheel gives 2,000 pounds.

This is *real power* in real safety for the Safety Car under all conditions. Variations in power are obtained by the use of larger or smaller hand wheels—the leverage 12 to 52, remaining the same. Just compare this power with the meagre 421 pounds developed by a human force of 50 pounds applied to the 20-inch wheel of the ordinary handbrake!! 421 pounds braking power, or 1,333 pounds — which brake for you?

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The Dozen Peacock Reasons

1. Saves half the space of the ordinary hand brake.
2. Weighs *less*.
3. Gives three times the braking power for the same human power.
4. Operates without binding — no staff — no bevel gears.
5. Simple in construction.
6. All operating parts above floor.
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9. Graduated stops and starts.
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12. Greatest economy in the long run.



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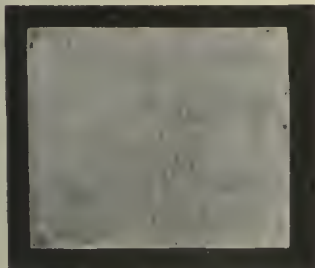
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This newly developed basic material, heat-treated by the Nuttall BP process, assures motor pinions unequalled for strength and wear.

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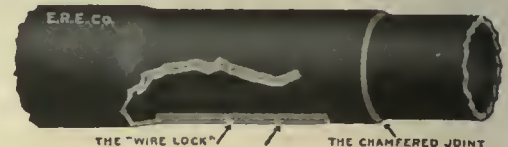
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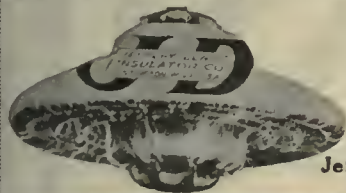
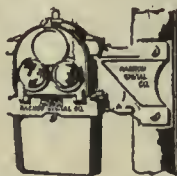
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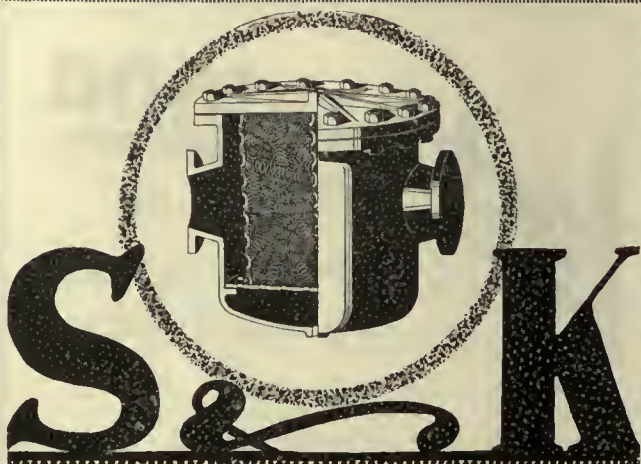
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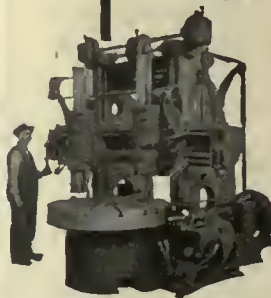
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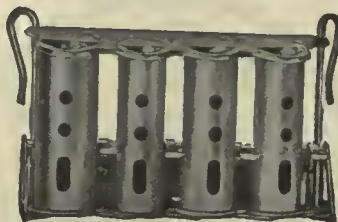
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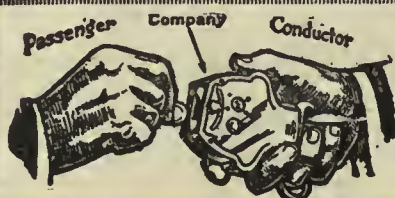
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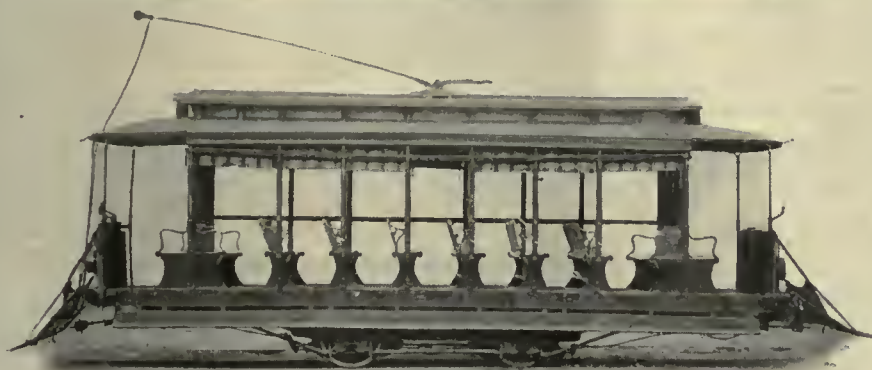


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St. Louis Car Co.

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Babcock & Wilcox Co.

Boller Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes, Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also
Poles, Ties, Posts, Etc.)

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Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake
Parts

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Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

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American Bridge Co.

Brooms, Track, Steel or Rattan
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Corlies Carbon Co.
General Electric Co.
Jeandron, W. J.
National Carbon Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Graphite
National Carbon Co., Inc.

Bunkers, Coal
American Bridge Co.

Bushings, Case Hardened and
Manganese

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Brill Co., The J. G.
National Metal Molding Co.

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Bound Brook Oil-less Bearing Co.

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Carbon Brushes (See Brushes,
Carbon)

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Westinghouse Elec. & Mfg. Co.

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Differential Car Co.

Cars, Passenger, Freight, Express,
etc.
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Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

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Electric Equipment Co.

Cars, Self-Propelled
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General Electric Co.

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Copper

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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

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American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

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Ackley Brake & Supply Corp.
Electric Service Supplies Co.
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Wood Co., Chas. N.

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Pantasote Co.

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Galef, J. L.

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veying and Hoisting Machinery)

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Comstock Mfg. Co.
Electric Service Supplies Co.

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Comstock Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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International Register Co., The
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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Cleveland Armature Works
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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.
Ingersoll-Rand Co.
Westinghouse Traction Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

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General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

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Chicago Fuse Mfg. Co.
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National Metal Molding Co.

Conduits, Underground
Johns-Manville, Inc.

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Westinghouse Elec. & Mfg. Co.

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Russell Mfg. Co.

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Columbia M. W. & M. I. Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

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Wish Service, P. Edward

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Williams & Co., J. H.

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General Electric Co.

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Ingersoll-Rand Co.

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Jackson, Walter
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Douglas
Republic Engineers, Inc.
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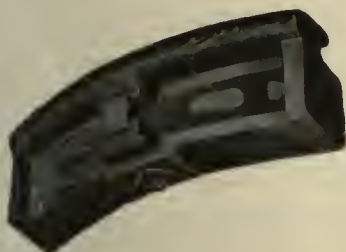
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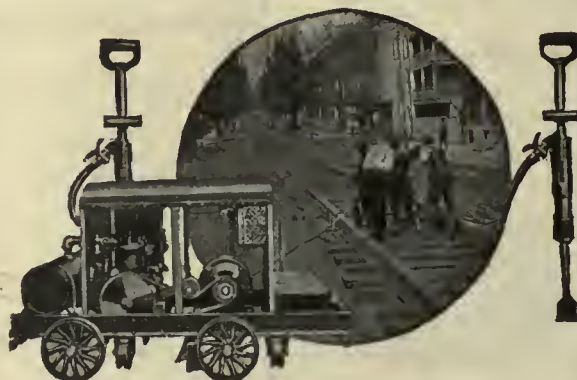
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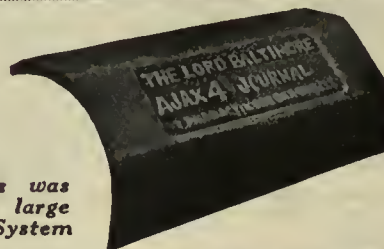
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International Register Co., The
Rooke Automatic Register Co.
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Carnegie Steel Co.
Lackawanna Steel Co.
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Columbia M. W. & M. I. Co.
- Resistance, Wire and Tube**
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Westinghouse Elec. & Mfg. Co.
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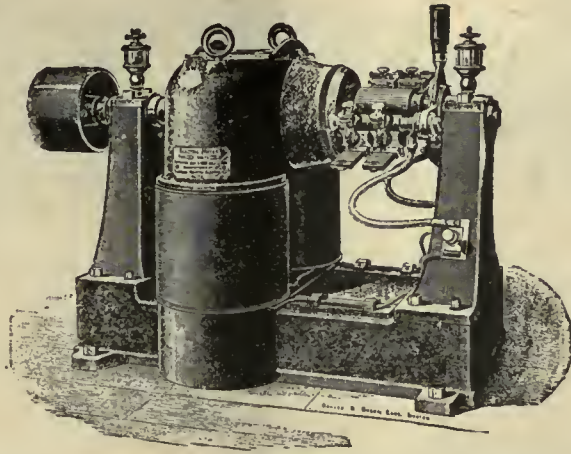


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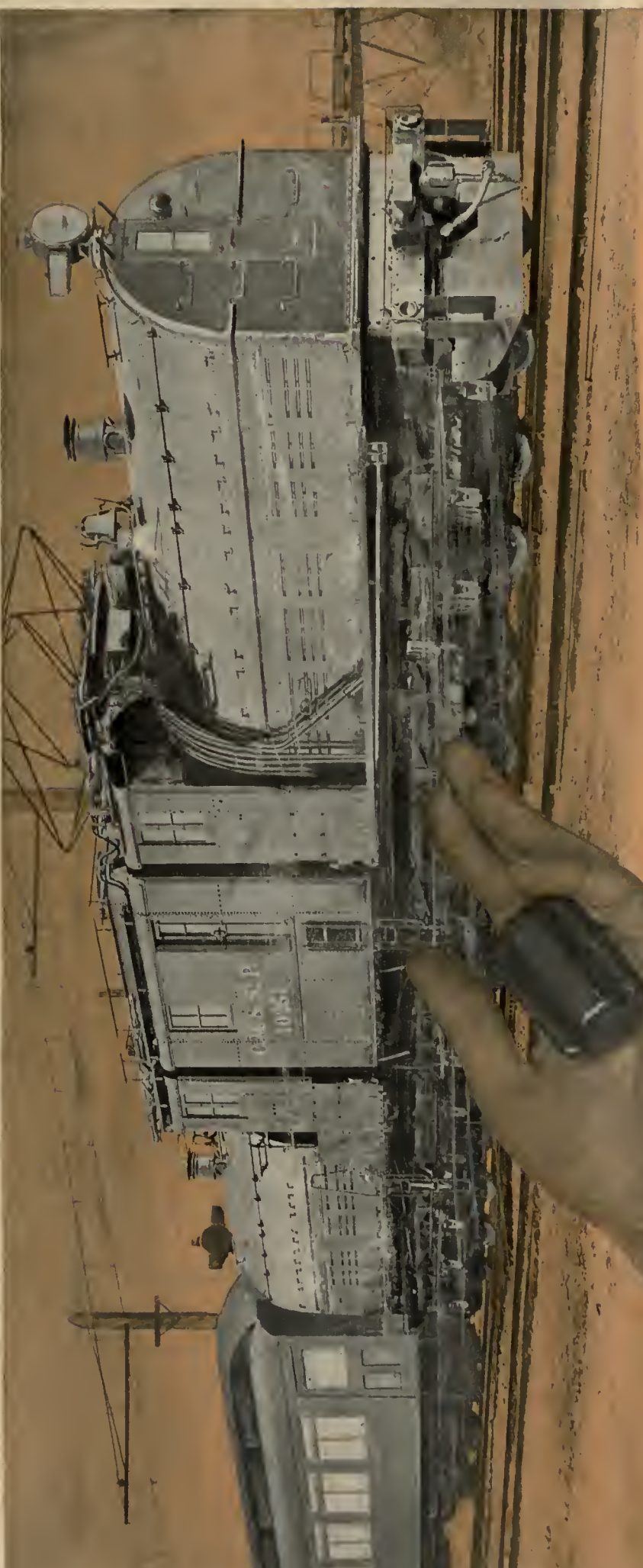
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Monthly Mechanical and Engineering Edition

ELECTRIC RAILWAY JOURNAL



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***For the expansion and progress of the industry
the application of modern methods is essential.***

***Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.***

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors

HENRY H. NORRIS, Managing-Editor

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Reducing the cost of machining armature shafts. The short keyway is advantageous. Collet and mandrel facilitate grinding of brasses. One-man armature shaft straightener, handy babbitting jig and new air tank support are other featuresPage 926

Testing Insulating Materials

There are certain fundamental characteristics which all insulating materials must have to meet the operating conditions, declares John S. Dean. The presence of these characteristics is determined by certain tests as described Page 931

Equalized Hand and Air Brakes and Braking Power

H. M. P. Murphy describes the method of obtaining equalized brakes on cars equipped with various types of brake rigging and gives examples solved for braking power, percentage of braking power and total leverage.....Page 935

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"DH-10"

For the Light-Weight Car

The DH-10 is a ten-foot air compressor for traction service that is designed to meet the requirements of the small, light-weight car.

It differs from the other Westinghouse "Bungalow" compressors in size and capacity only, being identical in all other respects.

This insures a compressor that adequately meets every condition in its field.

In principle and construction, the DH-10 merits the prestige won by smooth, steady, efficient, economical operation and low maintenance. The system of positive lubrication is a notable feature.

If your operations come within the 10-foot compressor class, you will find your interests served to advantage by the DH-10.

SEND FOR PUBLICATION 9045

Note:—The complete line of Bungalow Compressors includes three sizes of 10, 16 and 25 cubic feet displacement, the designations of these being DH-10, DH-16 and DH-25.

Westinghouse Traction Brake Company

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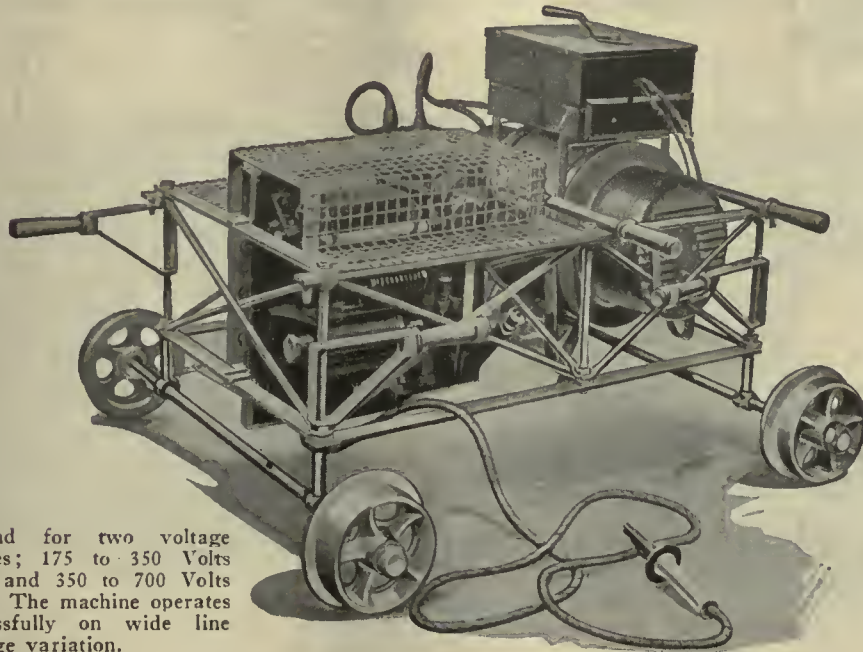


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WILSON Plastic-Arc Rail Bond Welder

Distributed exclusively by The Ohio Brass Company



Wound for two voltage ranges; 175 to 350 Volts D.C. and 350 to 700 Volts D.C. The machine operates successfully on wide line voltage variation.

A machine that teaches— and enforces—correct welding

Watch a master welder at work—a man who turns out uniformly excellent jobs. He uses a short arc.

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result is uniform heat per unit area in the weld. That's the way the Wilson-machine teaches the operator the master's method and enforces correct welding.

It embodies, in portable form, the best principles of electric welding for rail bonding, splice bar welding and shop work.



Full information awaits your request.

THE OHIO BRASS COMPANY, MANSFIELD, OHIO

Manufactures: Rail Bonds, Trolley Material, High Tension Insulators, Third Rail Insulators, Electric Railway Car Equipment.

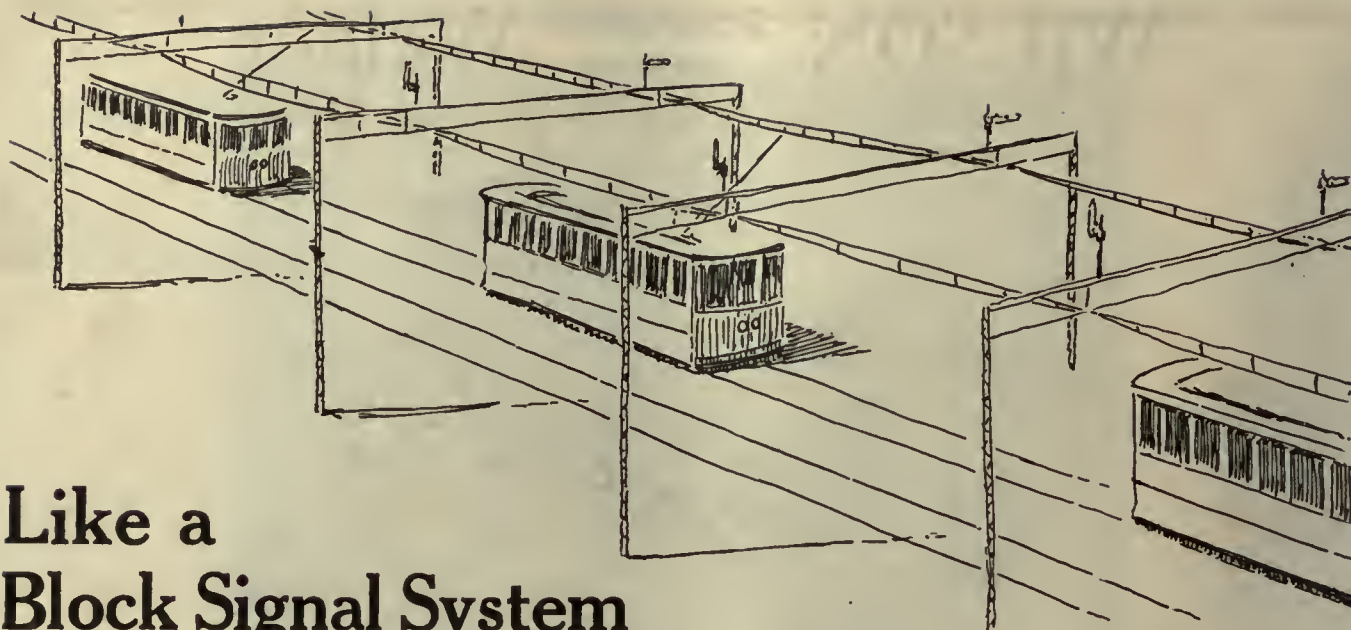


New York Philadelphia Pittsburgh
Charleston, W. Va. Chicago Los Angeles
San Francisco Paris, France



O-B Type AW-3 Bond—Patented—for ball of rail.

Has four fundamental features for a good job—"Steel to Steel with Steel" weld; wide angle scarf; protection for the strand at the terminal; steel reinforcement of the terminal.



Like a Block Signal System in Crowded City Streets

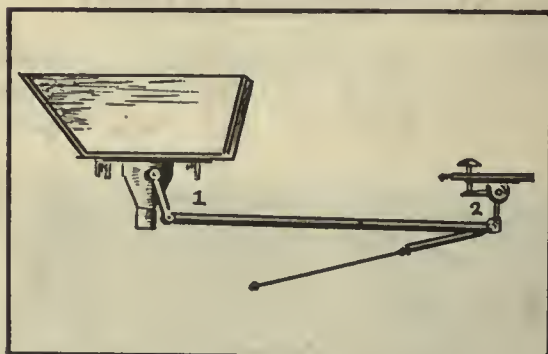
It would cost millions and lead to endless trouble to erect such a system—but you can gain all its benefits with Nichols-Lintern Indicating Signals. And not only will these benefits effect the cars, but they will extend to the other traffic (*autos, wagons, etc.*) as well.

N-L Indicating Signals—small red and green lights on the rear of each car—flash to the motorman of the following car exactly what the motorman of the car ahead is doing—the instant he does it.

These are the lights that flash to drivers of autos and wagons exactly whether the car ahead is going to stop, go slow, continue full or half speed. They operate instantly the controller handle moves.

These signals save power, by making it safe to coast. They also reduce the number of brake movements, causing less wear and tear on motors, brakes and trucks. They are **ESSENTIAL** equipment to make Safety Car operation safer.

—and this sander will stop the car
when the signals say stop



Here is all there is to it for the Safety Car—
rapidly and cheaply installed.

When the emergency comes—when the car must come up sharp—then you can depend upon N-L Mechanical Sanders. Your car is **NOT** helpless, should the air give out,—not when it has N-L mechanical Sanders. The Sand can be started instantly the hand brake is applied. It shoots, exactly when and where needed, without waste—with the slightest pressure of the foot.

No Safety Car or other car is *completely* safe without these Sanders. They are essential equipment, to supplement the air brakes. They mean the necessary margin of safety. Full details and literature on request.

The Nichols-Lintern Company
8404 Lorian Avenue, Cleveland, Ohio

Keystone Steel Gear Cases

"Riveted for Strength—Reinforced by Spot Welding"



Made in standard forms for practically all modern types of railway motors.

By experience it has been found that a rivet is strong in one direction and a spot weld in exactly the opposite — against slipping.

To secure the strongest possible construction Keystone cases are riveted and welded. Soft, open-hearth, special analysis steel of



extra quality is used in the construction of these cases and breakage or tearing out of the sides is practically unknown.

Brackets are either steel or malleable iron castings or steel forgings and the manufacturing processes and design of these cases insure maximum strength and service.

*There is a lot more about them—
Write for data sheets*



ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

Branch Offices: Boston, Scranton, Pittsburgh

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

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When Your Paving Looks Like This

Poor track brings poor service, a disgruntled public and decreasing revenue. Business in the vicinity falls off, real estate values drop and in many instances, strenuous means are necessary to save the road from ruin..



NELSONVILLE FILLER AND STRETCHER BRICK

will permit the use of "T" rail which is lighter, weighs less and costs less. Moreover, this pavement will not buckle up and disintegrate like that shown in the picture above.



Nelsonville Stretcher Brick
Nelsonville Filler Brick

Gives an Economical but Permanent Paving like this

because the ungrouted joint between the filler brick and the stretcher brick does not transmit rail vibrations—it effectively prevents any kickups or displacement of brick in the pavement.

Laid without grouting — permanent, tight, level pavement — minimum of repairs.



Let us tell you about the Nelsonville way.

THE NELSONVILLE BRICK CO.
Nelsonville, Ohio

Modernize!

Pneumatize!

Join This Procession

They're Pneumatized or Pneumatizing

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and many others

A modern car without one or more of these National Pneumatic producers of more revenue miles per hour every hour of the day is unthinkable!

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Door and Step Control
Motorman's Signal Lights

Door and Step Operating Mechanisms
Safety Interlocking Door Control

Multiple Unit Door Control

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Toronto, Ont.*

National Pneumatic Company, Inc.

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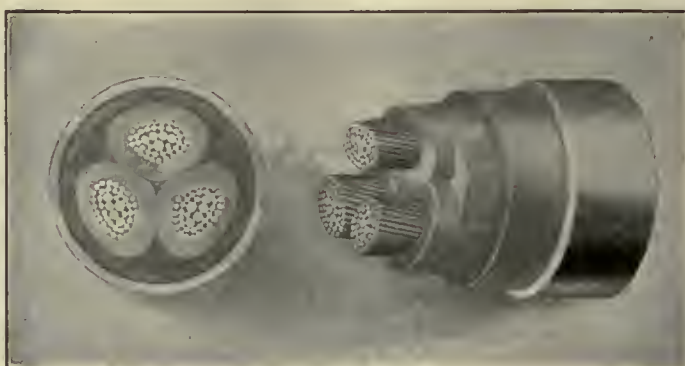
Works: Rahway, N. J.

HABIRSHAW

"Proven by the test of time"

Insulated Wire & Cable

Watch Here for Our Monthly Data on Mine Cables



Sector Cables

HABIRSHAW sector cables have their conductors formed to the lay of the cable before they are insulated. The paper, therefore, does not become wrinkled near the conductor as when the insulated conductor is twisted in cabling. When splicer's tape is applied to badly wrinkled paper, it leaves air voids. These voids are comparatively unimportant in manufacturing because the air is exhausted from them and replaced by compound, but in splicing it is practically impossible to remove all the air. Splices with air voids are weak.

Habirshaw Wire Manufactured by
Habirshaw Electric Cable Co.
Incorporated
Yonkers, New York



Habirshaw Wire Distributed by
Western Electric Company
Incorporated
Offices in All Principal Cities

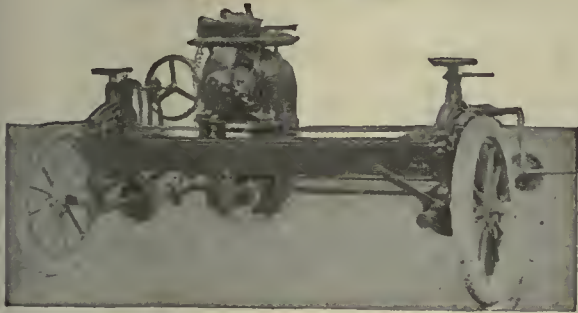
Paper Insulated Cable
Round Conductor Cables
Sector Cables

Varnished Cambric Insulated Cables
Armored Cables

Rubber Insulated Cables
Code (Black Core)
Intermediate (Red Core)
30% Hevea R. S. A. Standard



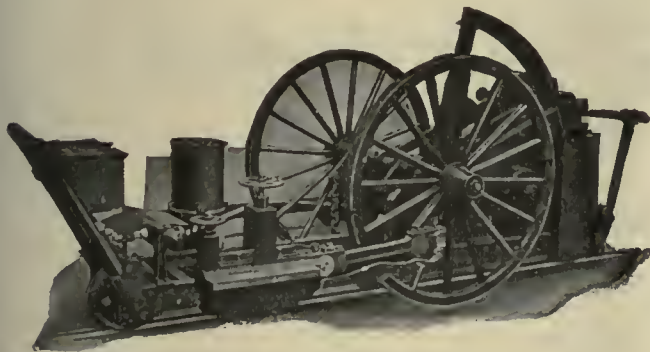
Hooverize Your Rail



The Universal Track Grinder has many features which facilitate and increase the accuracy of its work.



For getting into the grooves of girder rails, frogs, switches, etc., and for removing surplus metal used to fill up low or cupped joints the Atlas or the Universal Rail Grinder will produce excellent results.



The Reciprocating Grinder is especially adapted to grinding out corrugations, slightly cupped and new joints where a planetary grinding surface facilitates the work.

Secretary Hoover urges the elimination of waste in all industries. More power to him. Are you doing your bit toward banning waste on your road?

Hooverize your rail.

Cut out the sinful waste of ruining costly rolling stock, pounding the life out of your track foundations and alienating public good will, your most precious asset.

This shameful waste goes on wherever cars continue to run on corrugated rail, cupped joints and worn special work. The world today cannot afford it. The electric railway industry cannot afford it. You cannot afford it.

This waste — obvious, admitted and regretted — is so easily and so cheaply eliminated that there is not the slightest reason why it should continue. Further, it is so profitable to cut out this waste that there is not even a valid reason why any excuse for delay should be sought.

Any road, no matter how straightened its circumstances, can afford at least one rail grinder. And a grinder of the right type can be made literally to save its weight in gold.

Find out how other roads profit by rail grinding. We have some data on this subject. It is at your service.

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia, Pa.



Thermit Compromise Joint Between 9 in. Trolley Rail and 5 in. Tee Rail.

The Compromise Joint is the most costly joint on your system, because there is no satisfactory mechanical splice or joint for it.

While at first thought it might appear that the number of these joints on the average street railway system is so small as to be practically negligible, it is a fact that actually there are a great many more than would be reasonably expected.

The reason for this is not difficult to find. Owing to the very rapid development of electric traction, with the consequent increase in the weight of rolling stock and speed of operation,

it was necessary to increase the size and depth of the rail accordingly. Requirements of modern pavement also demanded frequent changes in the design of the rails, so as to offer as little interference with vehicular traffic as possible and still provide a good track. The result is that there is hardly a street railway system in the country that has not a great variety of sizes and types of rail in its track, and wherever these various sections come together a compromise joint is necessary.

Thermit Insert Welding **is especially adapted for** **eliminating this weak spot**

These welds can be made in the track or in short lengths or the two types of rail can be welded at your yard or shop and installed when opportunity offers.

The weld can be made in practically the same way as described for welding rails by the Thermit Insert process, but where only a very few joints are to be made the cost of wooden patterns can be eliminated and a wax pattern used instead. In this way a few joints can be welded quickly and economically.

Send for Pamphlet 3932, which describes and illustrates the method of welding compromise joints, ordinary rail joints and frogs and crossings by means of Thermit.

Send for our latest Rail Welding Pamphlet 3932.

Metal & Thermit

120 Broadway



Corporation

New York

Pittsburgh

Chicago

Boston

San Francisco

Toronto



*No signs of disintegration
after 12 years' use*

The Cedar Rapids and Iowa City Ry. has over 8000 feet of "ACMES" in use. Their many installations range in diameters from 18 inches to 48 inches. Some of the culverts are under fills of only 2 ft., while others are buried as deep as 40 feet. When asked (March 30, 1921) how these "ACMES" were holding up, their Chief Engineer wrote:

"Our

**"ACME" (NESTABLE)
CORRUGATED METAL CULVERTS**

have given and are giving excellent satisfaction. Even those which were put in as early as 1909 are holding up perfectly and show no signs of disintegration whatever."

12 years of service and still good! Yet this is nothing unusual for "ACMES." Made of anti-corrosive Toncan Metal they are expected to last! Made in 2-ft. upper and lower sections, they can be shipped either knocked-down or set-up. Our 48-page catalog tells why "ACMES" are preferred by so many culvert buyers — and in addition contains much valuable data. Send for your copy.



Things You Want to Know— And the Answers



Amazon Friction Tape is most economical, yardage considered.

Victor Tape is an excellent tape at a lower price. It meets all requirements of ordinary standard specifications

—and

every kind of electrical supplies for street railway operation and maintenance.

When the problems of operation and rigid economy thrust themselves upon you, they raise certain questions:

What equipment or supply item is available for a job?

Which of them is the most suitable?

Where is it available?

How long will it take to get it?

To solve these problems by answering the questions is the function of Western Electric National Service.

This Service distributes the products of a long list of manufacturers which collectively make everything electrical.

To aid in selecting the most suitable of these units for any purpose, Specialists are located at each of our Distributing Houses.

These Distributing Houses carry large stocks of electrical equipment and supplies. One of them is near you for there are 48 such Houses located in the principal trade centers.

Quick deliveries of everything you need are the rule because location certainly helps. Write our nearest office to get in touch with the Specialists or to obtain everything electrical.

**A
National
Electrical
Service**

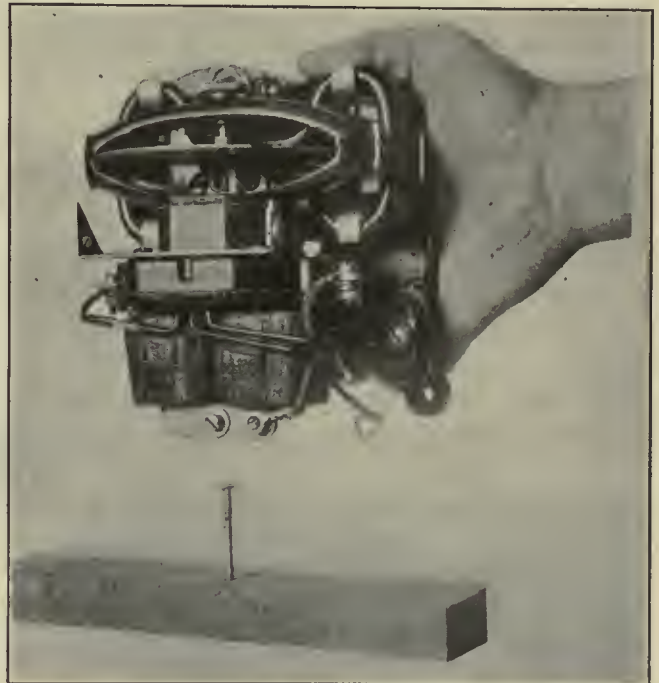
Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES

Saves Power! Sturdy! Rugged!

TRY this on the "works" of your power-saving device—driving nails. We do it frequently as proof of the ruggedness of Sangamo **ECONOMY METERS**. Jarring does not affect their accuracy.

A prime factor of a power-saving device is to record accurately under all service conditions the relative operating efficiency of motormen. Only a sturdy, rugged device will do this over long periods.



This meter element drove more than 200 nails at the last Atlantic City Convention and still was within 1% of accurate.

Economy Power-Saving Railway Meters, by recording the kilowatt-hours consumed, show both the motorman and the management the individual "power bills." Thus they get down to the very fundamentals of energy checking and saving. In addition individual car energy records afford data of high engineering value and a convenient basis on which to inspect car equipment.

**Economy Meters
on more than
75 Railways**

Meter the energy—that's what you want to save

Economy Electric Devices Company

L. E. GOULD, Pres., Old Colony Bldg., Chicago

Cable Address: Sangamo, Chicago

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Grayson Railway Supply Co., St. Louis

Ease of Installation

In the large amount of data which we have accumulated concerning the use of Armco Culverts, two vital points predominate, ease of installation and permanence. Ease of installation includes not only the actual work of installing the culvert under highways and railroads, but also the ease with which they can be loaded and shipped on cars, and conveyed on trucks, wagons, mule packs or by workmen to the locations at which they are to be installed.

Local conditions effect many installations to such an extent that the installation of other forms of culverts are often impracticable if not impossible. Hence economy of transportation and ease of installation favor the selection of Armco Culverts.

Armco Culverts once installed are on the job to stay for Armco Ingot Iron from which they are made possesses that high degree of chemical purity, homogeneity of texture and heavy galvanizing that enables the metal to withstand the deteriorating action of soil and climate. Hundreds of installations made ten or more years ago and in perfect condition today prove beyond the shadow of a doubt the rust-resisting and enduring qualities of Armco Culverts.



There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting ARMCO CULVERTS and other products of Armco Ingot Iron such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

ARMCO CULVERT & FLUME MFRS. ASSN.
215 NORTH MICHIGAN AVE. CHICAGO



Generator Room Mississippi River Power Co., Keokuk, Iowa

Irvington Insulation Stands the Test of Time

Irvington Varnished Cambric tapes have stood the most rigid tests and are accepted as the highest achievement in insulating tapes that ever have been produced.

The use of Irvington Black Varnished cambric tape in the equipment of the great Keokuk Dam on the Mississippi River and in other big projects is proof of its ability to assure continuity of service so far as insulation breakdown is concerned.

Irvington Products are famed for their six factors of quality. They have high dielectric strength, high resistance and flexibility, and are non-hygroscopic, heat resisting, and chemically neutral.

From the Irvington Research Laboratories scientific processes have been devolved, resulting in the manufacture of many new products. Irv-O-Slot Insulation, practically new but now almost universal in demand, is one of the latest developments of Irvington Research Laboratories.

Irvington Products

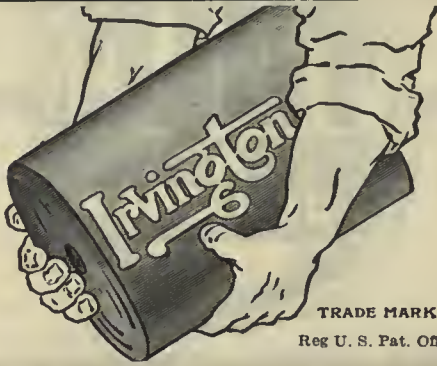
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|---------------------------|-----------------------|-----------------------------|-----------------------|
| Oiled Silk | Varnished Paper | Special Folded Paper | Insulating Varnishes |
| Black and Yellow | | for Coil Windings | Irv-O-Slot Insulation |
| Varnished Cambric | | Special Adhesive | Shellac Fish Papers |
| Flexible Varnished Tubing | High Dielectric Paper | Irv-O-Special Adhesive Tape | |

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.
Established 1905

Distributor

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L. L. FLEIG & CO., Chicago

ELECTRIC RAILWAY & MANUFACTURERS SUPPLY CO., San Francisco
T. C. WHITE ELECTRICAL SUPPLY CO., St. Louis
CONSUMERS RUBBER CO., Cleveland



TRADE MARK
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Why you should take advantage of Individual Lubricating Service

"Individual Lubricating Service" as given by TULC means: your equipment is considered separately from that of any other road.

Our "Overall Specialists" are not afraid of getting down in the pits with your men and going over all details pertaining to lubrication. They believe that instructing the "Oiler" is the best method of securing full satisfaction in lubrication.

We will let TULC run with any other material used for lubrication on your own cars and under your supervision.

"Overall Specialists"

The service men who work with you on your lubricating problems are not "experts on theories." They put on overalls and get right down to brass tacks—pack your cars—*show* you how and why Tulc should be used. They get results—real money saving results—99 times out of a hundred. The hundredth time there is no charge for the service.

The Universal Lubricating Co.

Offices: Schofield Bldg.

Works: Sweeney Ave.

Cleveland, Ohio



—scientifically and
accurately compounded to
reduce lubricating costs

PACKARD



Ten Years' Hauling for the D. U. R. and Still Hard At It

Illustrating the Packard Trucks' consistent ability to give continuous and economical service is the record made by Packards for the Detroit United Railway.

Back in 1911, four Packards were bought and put to work on line construction, the heaviest duty required of any of this Company's trucks. Each of these Packards is still hard at it.

During all of one year, 1919, and for six months in 1920, these four Packards worked eighteen hours each day, driven by two sets of drivers. They covered calls as far as fifty miles from Detroit.

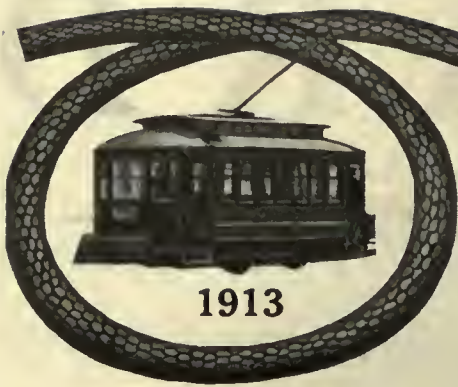
All the jobs assigned them require maximum power and dependability, yet the entire time taken off for repairs by all four trucks, does not total six months in ten years.

Besides being uncommonly well built, Packard Trucks have the great advantage of being rated accurately to the actual work they must do, by Packard transportation engineers. This assures always the right truck for every owner.

Every Packard owner has the benefit of local service facilities established to keep the Packard Truck at the highest possible level of operating efficiency.

PACKARD MOTOR CAR COMPANY · DETROIT

Ask the man who owns one



1913

to



1921

DURADUCT

In 1913 an electric railway committee on car wiring considered metal conduit as a matter of course for the all-steel and semi-steel cars becoming prominent at that time.

DURACORD The Quality Cord

Is entering only its second year in the electric railway field, but already many an electric railway man has ordered Duracord in the belief that it will prove just as superior to other portable wire and cable as Duraduct did to the conduits it superseded.

That belief we know will be justified because we would not put Duracord on the market until we knew that this woven covered cord would do anything that portable cords and motor leads do—and do it safer, better and longer.

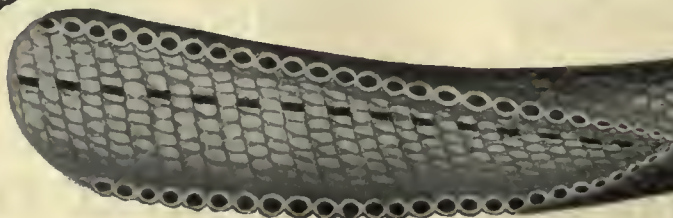
Won't you ask us to send you a specimen of Duracord with suggestions concerning its many applications?

Then along came Duraduct, the original single-wall, non-metallic conduit (always identifiable by the black dotted line on the interior surface), asking that its claims to superiority over metal be put to the test.

We asserted then that Duraduct was tough, flexible, fire-resistant, waterproof, non-collapsible, non-blistering, non-raveling, light as a feather and free from the need for elbows or threading.

In 1921 it is not boastful to say that these claims were made good, backed as they now are by years of service on thousands of cars.

Tubular Woven Fabric Co
Pawtucket, R. I.



\$500,000.00 increase in yearly revenue

Highly efficient Transportation Dept. of United Railways of St. Louis reports half million dollar gain.

JOHNSON FARE BOXES and METAL TICKETS Used.

"Increased efficiency in the collection of fares" is ascribed as the reason for the increase of approximately \$500,000 in the operating revenue of the United Railways of St. Louis for 1920 in the report of Receiver Rollo Wells for the year which ended December 31. The net income of the company in 1920 was \$1,083,428, a larger net income than the company had earned in any year since 1912.

Concerning the collection of fares, Receiver Wells made the following statement in his report:

"The combination of the reduced rate of fare with the increased rates of wages and increase in rates for power, serious as they have been, would have been disastrous *had it not been for drastic improvements in the efficiency of the fare collection on the cars* and for other improvements in the efficiency of the service.

"A careful analysis of the reports of car auditors for the years 1919 and 1920 indicates that of the increase of 24,183,938 paying passengers reported as hauled in 1920 over 1919, *about 32 per cent or approximately 7,800,000 of the increase is due, not to actually increased travel, but to the fact that those fares got into the treasury of the receiver.* This improvement had been very marked in 1919 over 1918, but much more marked in 1920 over 1919. *This means that there was approximately a \$500,000 increase in gross passenger revenue in 1920 over 1919, due to this one item of increased efficiency of fare collection.*"

Johnson Fare Boxes and Metal Tickets as the tools of an efficient transportation department accomplished these results. They will do the same for your property. Let us tell you how.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.



Two-thirds of America's electric "Bound-Brook Oil-less" Trolley Wheel Bushings are now used by two-thirds of America's electric railway systems.

Reduce Trolley Wheel Maintenance

ELECTRIC Railways, throughout the country, are facing the problem of maintaining their equipment with little money. New ways must be found to offset the decreased revenues.

In cutting maintenance costs, why not start with the trolley wheel. The constant expense of adjusting and replacing worn-out trolley wheel bushings can be practically eliminated by proper lubrication.

Trolley wheels are no more serviceable than their bushings, and

only those bushings are efficient that function so perfectly as to eliminate maintenance entirely.

"Bound Brook" Oil-less Trolley Wheel Bushings are the successful barrier to neglect. Packed solid in a lattice grooved core, their specially prepared fine graphite provides the lubricating cushion—the positive protection for the life of the bushing itself.

Protect the life and usefulness of your trolley wheels. See that they are all equipped with the genuine "Bound Brook" Oil-less Bushings.

Bound Brook Oil-less Bearing Company

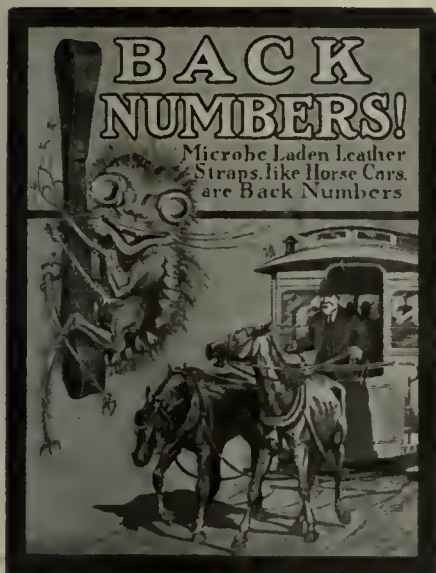
Specialists in the manufacture of Oil-less Bushings for more than a third of a century.

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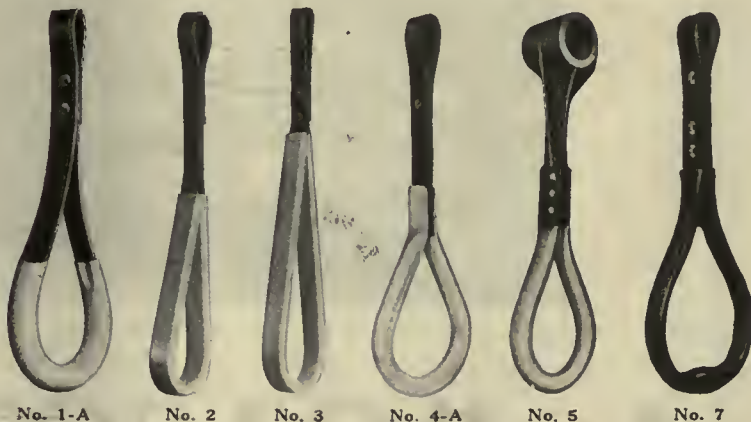
Detroit Office: 1723 Ford Bldg.

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Standard on Leading Railways



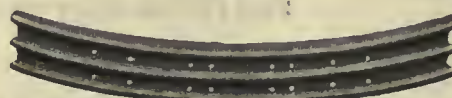
Save Power
by
Teaching Your Motormen
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**RICO
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Light Weight
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against
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RAILWAY IMPROVEMENT CO.,

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Agasote Roofing and Pantasote Curtains specified for the 40 new Safeties lately put in service in Racine, Wis.

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Agasote car roofs help reduce car building costs and are superior to wood.

Agasote is a homogeneous, fibrous material which comes in sheets cut to size ready for application.

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There is one, and only one, reliable test of the ability of lubricants—that of performance in actual service. It is this conclusive test of merit that has caused *Galena Oils* to be specified by the great majority of America's electric railways—they have done and are doing the work with an efficiency and economy that deserves and demands such preference.

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An article which increases efficiency, eliminates hazards, and reduces maintenance cost of existing equipment, merits investigation



Line Breaker cover lowered showing relay

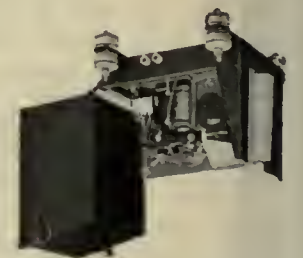
A Line Breaker Under the Car

A drum controller arcs destructively at the contacts when the motorman "notches 'er up" or shuts off. It's because the controller is not merely adjusting speeds, a service for which it is primarily intended, but it is also opening and closing the motor circuit. The G-E line breaker removes from the controller the function of opening and closing the main motor circuit and, through an overload relay, protects the motors against improper acceleration. It replaces the familiar overhead hand-operated breakers, putting the flash and noise down under the car where they can't cause panics or scorch hats.

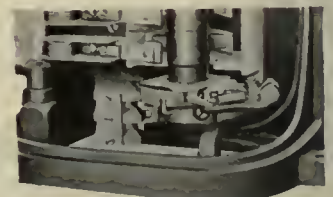
In operation when the controller cylinder is notched to the first point and the fingers and segments are in contact, a ratchet switch in the controller closes, causing the motor circuit to be completed through the line breaker. The least backward motion of the controller handle opens the ratchet switch, which in turn immediately opens the line breaker contacts. It is then necessary to turn the controller cylinder to the "off" position and on again to close the circuit.

G-E line breaker equipments are cutting controller maintenance cost and making car operation more economical on many street railways.

Ask for Bulletin 44678



Cover removed showing contactor



Ratchet switch installed in bottom of controller

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 57

New York, Saturday, May 21, 1921

Number 21

A Number of Celebrations Were Held on May 4

THE prominence that was given to National Electric Railway Day by the newspapers generally throughout the country on May 4 and 5 indicates the importance in which the industry is held by those who deal in publicity. The committee on publicity is to be congratulated on the success of its national advertising. It was a notable achievement in so short a space of time to enlist the support of so many companies and to have them successfully stage demonstrations of one sort or another. That this was possible shows a realization on the part of the industry that up-to-date merchandising methods bring results. Few believed that National Electric Railway Day could attract such widespread attention. But when virtually all the papers of the country carried either a national or a local story of the development of the electric traction industry the effort was well worth while. The effect on each property of thus recalling the history of the enterprise to the people's memory must be beneficial. It should result in a better general understanding of the railway's problems, help to change walkers to riders and conduce to a more sympathetic attitude on the part of the public toward the railway's affairs. Means which will bring about these results are worthy of encouragement.

Keep the Coal Moving from Mine to Power-House Bunker

THE National Coal Association is making a strenuous effort to stimulate prompt buying of coal, as the demand during the past four months has been "off" to an alarming extent. As the producing companies have practically no storage facilities this means that there is an accumulated deficiency in production, which will necessarily cause congestion later. The movement will remind electric railway men of the paper read at the Atlantic City convention last October by Eugene McAuliffe of the Union Colliery Company, St. Louis. He explained clearly the coal problem as it is viewed by the producer. He showed how the consumer exerts a powerful influence on the cost and adequacy of coal production, and advocated legislation which would provide for a seasonal variation in freight rates to induce flow at times of otherwise light demand. He showed, also, that the *bête noire* of the coal business is this light demand during the first few months of the year, which is illustrated to an extreme degree by conditions in 1921.

The Coal Association seeks to lay the burden for present conditions on the consumers, but the latter, at least as far as the electric railways are concerned, are justified, to a considerable extent, in "passing the buck" back again. A buyers' market has replaced the sellers' market which existed during and immediately after the war, putting the electric railways in a better position than they occupied formerly. They will undoubtedly, however, co-operate in a movement to cause uniformity

in coal demand, but the producers must so adjust prices as to overcome the present obstacles as to the placing of orders. The railroads have an important part to play here also. Granted, however, that the electric railways are convinced that all is being done by the mines and railroads that can be done, then they are justified in storing the maximum possible quantities of coal, for they will profit in the end financially and otherwise when the mines operate with greater regularity.

Coal Demand Is Affected by Many Considerations

THERE is no doubt it is desirable to keep the coal mines operating and the coal moving. But what are the factors involved? In this connection three main questions arise: First, why is the demand so light this spring? Second, can electric railways buy more coal now than they require for current needs? Third, what economic forces can be modified to improve the situation as a whole?

As to the first question, undoubtedly the situation is a reaction from the condition of last year, when the supply which could be delivered was far less than the demand, and prices soared. Prices are lower now and the former car shortage has been replaced by a surplus, but the consumers do not buy. There are several factors in this which may be suggested by these possibilities: There may not have been a price drop considered to be commensurate with what is justified by conditions, even though prices are now lower than those set by the coal administration during the war; the actual conditions may not be fully understood; there may be lack of confidence in the stability of prices; the financial stringency may cause a willingness to "take a chance" as to higher prices and possible later shortage; there may be some apprehension as to ability to store much coal without serious loss and some question as to the economy of investing money for this purpose; there may not be any conviction that present lack of demand means later shortage.

As to the second question, the electric railways already do a great deal in the way of storing coal. Investigations made by the American Electric Railway Association indicate that on the average about six weeks' supply is carried. The coal requirements of the electric railways are rather uniform, but they naturally need a reserve to insure continuity of service and they desire to take advantage of any money saving which is within reach. Hence they have considered storage a desirable part of their power-plant program. Probably they can stretch their storage space a little if they can see their way clear to buy coal to fill it.

After all, the principal way in which the electric railways can help the producers is indirect rather than direct. Nationally the electric railways now "cut quite a figure," much more so than before the war. Thus they are in a position to help, more perhaps than for-

merly, any practicable scheme for improving the coal situation. They can keep the subject prominently before their constituency and can join as an industry with other great coal-consuming utilities and with coal producers and transporters in removing unnatural barriers to the production, carrying and utilization of that basic necessity, coal.

Conditions Are Better on Several Typical Properties

CORROBORATION of the cheerful outlook for the future reflected in the recent figures of earnings of the electric railways as made public by the American Electric Railway Association is to be found in the returns which are contained in the annual reports of the individual companies for the year ended Dec. 31. These reports are now being received for review and almost without exception they show that the corner was turned some time ago. This does not mean that trying times are over. Far from it. But the returns coming in do indicate most healthy growth in gross receipts, with expenses within bounds and the prospect bright for operation in the future at lower cost.

An example or two will suffice. All the roads examined show healthy growth in gross. In one or two instances, in fact, this growth has been phenomenal. Thus one strictly interurban road shows an improvement in gross over the previous year of about \$1,000,000, while the net increased only \$46,000. This seems disproportionate. It is. The cheering fact, however, is that the growth of the business has been substantial and may reasonably be expected to remain constant and even to go on increasing, while there is every prospect that expenses will be reduced through decreases in operating costs, with the result that the spread between gross receipts and expenses will widen.

On another property doing a combined city and interurban railway and lighting business the gross earnings have grown from \$10,521,000 in 1913 to \$21,350,000 in 1920. The increase in the receipts on the interurban lines in this period has been 99 per cent and on the city lines 52 per cent. The operating ratio, which in the case of this company is always quoted inclusive of taxes, has gone from 58.8 per cent to 72.7 per cent. Even so, a return to the average operating ratio of about 60 per cent would mean a difference to the benefit of the company of more than \$2,000,000. Many there are who will be apt to say that it is too much to expect an early return to the old operating ratio, yet the prospects for this property most certainly appear bright.

On still another property a saving of more than \$1,000,000 was brought about at one fell swoop by a recent reduction in wages. It may be that much of the money thus saved will find its way back into the property in the nature of improvements. Even if it does, the equity of all the security holders will be increased just that much and the financial credit of the company will be bettered accordingly. Sight must also not be lost of the fact that the prospect for the further easing of money rates in the near future should result in no inconsiderable saving in interest charges to companies, when refunding is carried out of borrowings negotiated at high interest rates during the wartime competition for loanable funds. Moreover, the better morale now everywhere apparent is an advantage very often incalculable in the form of dollars and cents, but not intangible in a case such as that at Kansas

City, where 900 fewer employees are this year employed in operating the largest number of cars in the history of the company.

Reports of a group of syndicate properties widely scattered geographically confirm what has been said previously with respect to the outlook of the individual properties to which reference has been made. True, the recent depression in business has affected adversely to some extent the gross receipts of a number of companies, but with a revival in trade and lower cost for labor and supplies, all companies ought soon to be in a much more healthy condition. Here and there a manager still struggling fiercely with the problem of making both ends meet may be inclined to think we are chasing rainbows, but that will be only because he has been so deeply employed in trying to steer his own ship home safely through the fog that the ray of sunshine which is penetrating the mist in the distance has not yet been discernible to him.

Serviceable Use Found for Mr. Edison's Questions

AIDED and abetted by the Encyclopedia Britannica, the Book of Knowledge, Young's Astronomy, Bartlett's Familiar Quotations and Montgomery's American History anybody can answer the question, "Who was Marion?" and a lot of others propounded by Mr. Edison. It is an advantage, of course, to be well informed, and even the encyclopedic mind has its utility, but, as Spencer held, it may be said that education has a much higher function than developing in its recipient the ability glibly to answer questions about a lot of unrelated subjects. More particularly it is hard to see the value of questions such as Mr. Edison has propounded if applied in a test to determine the qualifications of an applicant for the position of a motorman or conductor or one seeking a job in the engineering, accounting or legal department of a railway.

Other doubting Thomases have also come forward. Among them is none other than Frank Hedley, president and general manager of the Interborough Rapid Transit. Mr. Hedley is peculiarly well fitted to judge. A graduate of the school of hard knocks, he knows the weaknesses of both the self-educated man and the college graduate, but he comes out strong, all other things being equal, for the man with collegiate training. It is Mr. Hedley's opinion, based on experience, that the man cannot be held down who does things a little better than some one else. Failure to answer questions such as Mr. Edison has set us as a standard will never daunt the ambition of men who are bent on being well informed on their chosen work or the work into which fortune, good or ill, has cast their lot. The views of Mr. Hedley on measures and men as expressed by him recently before the Cornell Society of Engineers are noted elsewhere in this issue.

While Mr. Edison's quotations may not be directly applicable to railway work, the compilation of his list offers this suggestion to the editors of publications circulating among the rank and file of the employees. Let them publish a dozen or so of such questions each month and answers the next, based on the little-remembered facts of history, civics, biology or chemistry, and even phases of railway work. Such a selection would renew the acquaintance of their readers with this knowledge and would be of much greater value than the general run of puzzle questions. Similar questions could also be propounded in circulars intended for distribution to the

general public, and herein, it appears, lies the greatest utility of conundrums such as those propounded by the "Wizard of Menlo Park."

Remodeling Cars Is Marking Time

REPORTS are coming from all over the country of cars being remodeled and reconstructed for one-man operation. A considerable number of these cars before remodeling were considered obsolete or at least obsolescent. Many are open cars, and a large majority are double-truck cars. The reason for this increase in car remodeling is evident. The railways need additional equipment to maintain their service but have little money available for buying new equipment. The cost of such remodeling runs from \$800 up to more than \$3,000, depending on the extent to which changes are made. In most cases the operating companies are thus enabled to obtain from two to six remodeled cars for the same cost that one new safety car costs.

Generally the reason given for remodeling instead of purchasing new equipment is that of economy, plus necessity. Almost any company will admit that new equipment is more desirable than that built over, but it wants its equipment to keep pace with its growing traffic and claims that this is the only way in which this can be done. But if the question is one of economy, decision as to the policy to pursue can be determined only when all costs are considered, and negligence in this matter may mean that erroneous conclusions are reached.

The cost of old equipment does not end with the shop expenses during rehabilitation. The car body, besides being old and perhaps not well adapted to the new service, is pretty sure to be much heavier than modern equipment. The motor equipment, if old in style, is almost certain to be wasteful of energy, subject to a much higher maintenance expense and slow in acceleration. Finally, with the automatic devices, power-operated doors and step and other equipment for quick acceleration, retardation and passenger interchange, the modern cars make shorter stops and have a higher schedule speed—all of which means a great saving in expensive car-hours. Altogether, therefore, estimates on the economy which will result from the use of rebuilt equipment should include all of these points before definite conclusions can be drawn.

The remodeling which is being done should help to determine the size and capacity of cars that can be handled satisfactorily by one man in various classes of service. Many of the remodeled cars are much larger than the standard Birney car, and their use should demonstrate whether a larger type of car can be used in such service when operated by one man. The question of using a double-truck car instead of the single-truck type now used for

one-man operation will also receive considerable attention. Broadly speaking, there is no doubt that the double-truck car has easier riding qualities than the single-truck type, as at present constructed, and is therefore more popular with the traveling public. Whether the economies resulting from the reduced weight of the single-truck car are more than sufficient to offset the advantages of the double-truck car is a question that this remodeling should help to solve. Viewed in its general aspect, the remodeling of cars is really a marking of time by the railways to tide them over this period of depression, yet this work should help to solve many points which are now open for discussion and eventually lead to a type of car which will be an advance in the art.

The Law of Compensation Remains Immutable

"PALPABLY erroneous and at best irrelevant" are the words with which the receivers of the Pittsburgh (Pa.) Railways dismissed the charges made against the company by George N. Munro, special solicitor for the city. Briefly these charges, as described in the last issue of this paper, were that the property was being rebuilt out of earnings at the expense of the car rider, whereas much of the work done was really a charge to capital. From the evidence at hand, railway men will be inclined to agree with the receivers. The facts are that the Pittsburgh Railways was long made the butt in political intrigue, with the result that the creditors eventually had to appeal for protection to the court. The managers of the road did the best they could before the receivers stepped in, but they were forced, in order to keep things going, to live out of capital. Through no fault of their own, except that of not being able earlier to convince the regulating authorities of the need for higher fares, the former managers had been compelled to see the utility of the property as a public service gradually dwindle. They were powerless to do the impossible. The court, however, said that the first duty of the receivers was to the public, and it is under the mandate of that body that the property is being rebuilt into fuller usefulness.

There is much to quarrel with in the report of Mr. Munro, but the principal objection to it is not so much

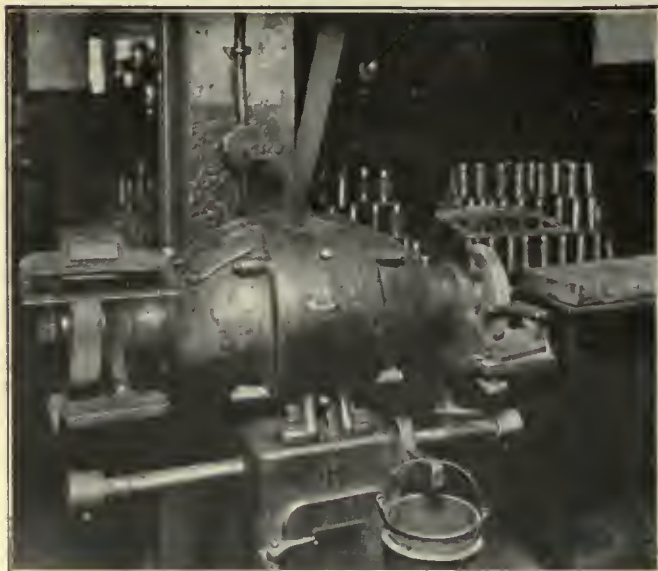
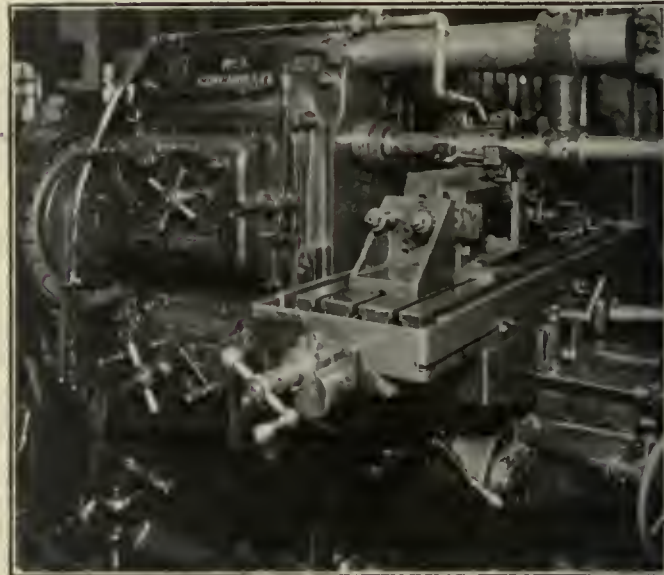
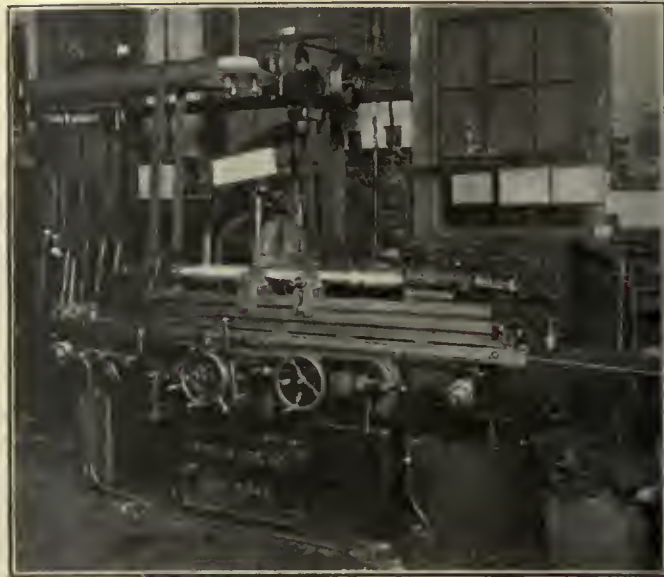
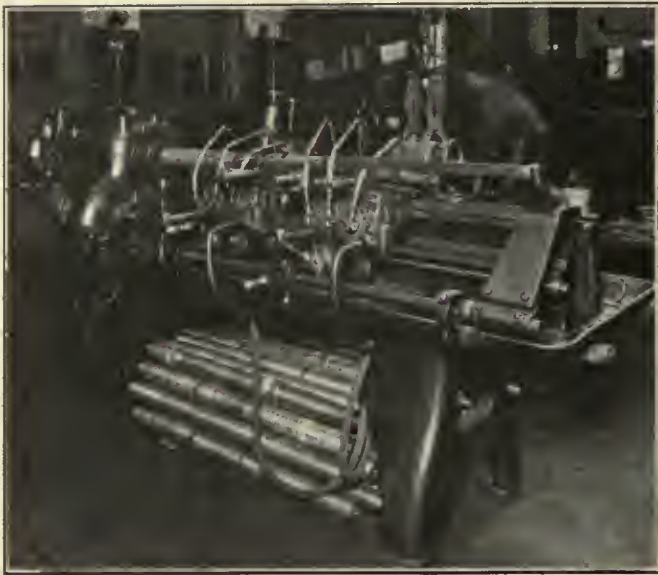
what it says, but in the intimation that the riders of Pittsburgh are being milked by receivers who are interested only in rebuilding the property out of the earnings. This of course is not in accordance with the facts no matter which of the three sets of valuation figures is accepted as a criterion of the value of the road. Residents of Pittsburgh rode for months at less than cost to the company. They must expect now to make good for that orgy. The only other way is abandonment and dismantlement. The law of compensation still remains immutable.

Quotation from the Federal Electric Railways Commission Report

No. 21

THAT street railway service and jitney service cannot permanently exist and pay their own way in competition with each other under any ordinary urban conditions seems to be well established by experience and by the conditions inherent in local transportation service, but the belief is general that the motor bus may properly be used to supplement the service rendered by the street cars. The motor bus may be used to render a sort of supplementary service, such as the service now rendered on Fifth Avenue and certain other high-grade residential streets in New York City by the Fifth Avenue Coach Company, or the buses may be operated on other independent routes merely as feeders to the street railway system to take care of traffic in partially developed territory in advance of the time when street railway tracks can be laid with reasonable assurance that the investment will be self-sustaining.

Chicago Surface Lines Tools Which Effect Economies in the Shops.



Top, left, six-operation "Lo-swing" lathe which speeds up armature shaft turning for Chicago Surface Lines.

Top, right, grinder used in finishing armature shafts, brass axle bearings and for miscellaneous work.

Middle, left, one-man shaft straightening machine. Friction driving pulley against armature while chalking eccentricity.

Middle, right, forming cutter and milling machine used in re-machining built-up truck pedestal gibs.

Bottom, left, emery wheels fitted with glass protectors to make certain the protection of workmen's eyes.

Bottom, right, babbitting jig by which uniform dimensioned bearings are assured and which eliminates waiting for cooling.

A Few Chicago Shop Economies

Reducing the Cost of Machining Armature Shafts—Short Keyway Advantageous—Collett and Mandrel Facilitate Grinding of Brasses—One-Man Armature Shaft Straightener—Handy Babbitting Jig—New Air Tank Support

ALL replacement armature shafts for the Chicago Surface Lines are purchased in the rough blanks and machined and finished in the company's shops. This has been the practice for years, but the tools and machines employed were such that there was a good deal of difficulty in keeping up with the demand. Recently a special layout of machine tools was devised which now enables the shop not only readily to keep ahead of requirements but to turn and finish a shaft for a labor and overhead cost of approximately \$4.75, as against an outside comparable cost of \$15.

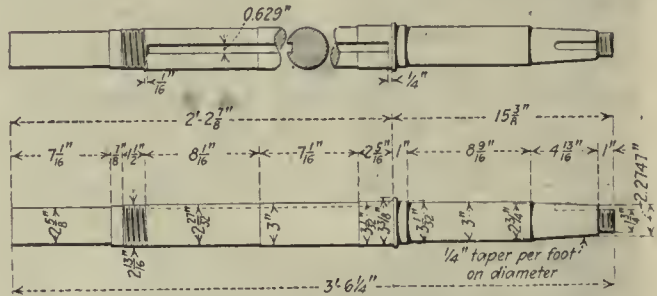
A group of seven machines is conveniently arranged for the progress of a shaft through the seven steps in its manufacture. It is first mounted in a centering machine and the ends drilled and countersunk for the lathe centers. A roughing lathe, adjacent, equipped with a high-speed cutting tool, turns off the rough surface and brings the shaft down in one pass to a size slightly larger than the biggest diameter. The shaft is then placed in a "Lo-Swing" lathe made by the Fitchburg (Mass.) Machine Company, in which the seven or more surfaces are turned. This machine, pictured herewith, is capable of performing six cutting operations simultaneously and each operation is equipped with an automatic feed and stop so that the length and depth of cut are automatically controlled. It is also equipped with a tapering device so that the taper for the pinion seat is made while the shaft is swung in this lathe, and this cut is likewise automatically controlled. The final cut on each surface of the shaft is made with a finishing tool.

The next step is to put the shaft in a grinder, shown herewith, where the various surfaces are brought down to the final diameter and a very smooth finish, an allowance of 0.012 to 0.015 in. being made for this finishing operation.

On the next and fifth step the shaft is swung in a lathe set up especially for threading the shaft. Next, the shaft is placed in a circular mill and the long center keyway for keying the armature core laminations and commutator is cut. For the seventh and last step the shaft is mounted in an end mill in order to cut the keyway for the pinion key. This is cut by first forcing the rotating end and side-cutting tool straight in radially, drilling a hole to the finished depth of the keyway and then side-cutting axially out toward the end of the shaft and coming out of the tapered surface just above the threaded end.

By means of these seven machines it is possible to complete nine shafts per eight-hour day and bring them to an accurate size and high finish. The grinding operation is the limiting step in the speed of production, so that in putting through shafts of a given type in lots of 100 the machinists on the six other steps are used on other work after completing their particular part of the machine work on the lot. By putting the shafts through in quantities of one type the time lost in setting up the machines for the different types is reduced to a very small item.

A new kink has been worked out in connection with the keyway for the pinion, which is designed to preserve the maximum strength of the shaft at the inner end of the taper where the maximum strain takes place. The keyway is machined only from a mid-point of the tapered surface to the end, leaving the full section of the shaft at the inner side of the pinion. It was felt that with a perfectly tapered and finished shaft and pinion, and with pinion properly pressed on, no key whatever is really needed. However, H. H. Adams, superintendent of shops and equipment, and T. A. Shaughnessy, master mechanic of the West Side shops, were not satisfied to depend altogether on friction, though they did conclude that a half-length key would



ARMATURE SHAFT FOR G. E. 226 MOTOR, SHOWING HALF-LENGTH KEYWAY FOR PINION

give adequate insurance against loose pinions. A drawing of a shaft showing the dimensioning of the half-length keyway is reproduced herewith.

OPEN CIRCUITS TRACED TO CORE SLIPPAGE

Considerable trouble with open circuits due to breakage of the commutator leads on a type of motor having a very short core has been experienced in Chicago. The cause of this trouble was sought for a long time and various remedies were applied. The trouble continued, however, until occasion arose to renew several armature shafts. Then it was found that a very slight slippage of the armature core laminations on the shaft, amounting to something less than $\frac{1}{16}$ in. at the periphery of the core, was taking place. Investigation developed this fault to be frequent, the existence of slippage being indicated or determined by sounding, by worn keys, by testing with a bar, rusty shafts, front core castings loose, etc. As any movement of the armature core on the shaft would be transmitted directly to the commutator leads and likely result in crystallization of the copper, this condition was hit upon as one cause of the unduly large number of opens. Hence, as these motors have been in service for a number of years, they are all being dismantled and rebuilt in a fundamental way as rapidly as they come in, so that there should result a material lowering of the maintenance cost in the future. In doing this work the old shaft is pressed out and the laminations bolted together, rebored for a shaft $\frac{1}{8}$ in. larger in diameter and a new keyway cut in them.

Since this remedy has been applied the trouble has apparently been eliminated. The experience is pointed out here simply to suggest that this is a possible source of open circuit trouble, which, though uncommon, may explain a similar trouble on which other equipment men may have been seeking light.

GRINDING BRASS BEARINGS FACILITATED

The grinder above referred to is used between armature shaft jobs for grinding the exterior surface of the brass axle bearings. These are turned down to within 0.012 in. of size with a finishing tool and then ground to size. The set-up of the bearings for grinding has been made a very simple and quick operation by the use of an expanding collet. This is put inside the bearing and both are dropped over a mandrel, the large

forming a part of the straightener, was lengthened and a 6-in. pulley attached. This was belted to another pulley mounted on one end of a short countershaft at the end of a pivoted bracket. On the opposite end of this shaft is a leather-faced wood wheel, which, as the bracket is lowered, bears against the periphery of the armature, causing it to rotate. The position of this bracket is controlled by a foot pedal brought down underneath and in front of the machine.

The operator swings an armature requiring attention into the machine and then, resting his hand against the bed of machine, steps on the foot pedal, bringing the leather faced wheel down against the armature. As the latter rotates the eccentricity is gaged and chalked. When this is done pressure on the pedal is released and the bracket automatically pivots up out of the way.



MANDREL COLLET AND BRASS BEARING ASSEMBLY
USED FOR QUICK SET-UP OF BRASSES IN
GRINDING MACHINE

end of which is tapped solidly against a block of wood, locking the bearing firmly on the mandrel, which is then quickly placed between the grinder centers. The collet and bearing are easily removed by similarly champing the small end of the mandrel against the wood block. The collet and bearing assembled on the mandrel are shown in an accompanying picture. The collet may be seen through the hole in the bearing. The inside of these bearings is smoothed only with a finishing tool and a film of babbitt is run in to start the bearing off.

It usually requires two men to do a satisfactory job of straightening an out-of-true armature shaft, for with the ordinary rig one man can hardly rotate the armature with one hand and at the same time gage and mark the high spots with the other. In the West Side Chicago shops, however, the straightener has been supplemented by a simple means of rotating the armature so that one man can easily do all of the work alone.

The flywheel shaft of the pump, which runs continuously and supplies the power to the hydraulic press



A HALF BAND BRAZED ON THE AIR RESERVOIRS
PROVIDES AN IMPROVED METHOD OF
HANGING THEM

The armature is then properly set and pressure applied to spring the shaft.

The Chicago surface companies have in use 2,000 Pullman trucks which are provided with no wearing plates on the pedestal gibs or jaws. When these surfaces become worn, therefore, they are reclaimed by welding, building up the worn surfaces and then machining back to size. This machining is expeditiously done by using a forming cutter which mills the three bearing surfaces, front face and two edges, to the final size and finish in one pass. An accompanying picture shows clearly the type of machine and cutter used and the L-shaped pedestal jaw as mounted in the milling machine.

GOGGLES THAT ARE ALWAYS USED

In a picture reproduced herewith it is seen how the need for goggles for workmen while using the emery wheels is dispensed with. It is difficult to secure proper use of goggles; the workmen do not always have them handy, and if they have them they often forget to use them. So 100 per cent safety in this respect is secured

in the Chicago shops by attaching a rectangle of glass in a metal frame to the framework of the emery wheel in such a position that the workman automatically looks at his work from behind this glass shield. All the emery wheels are equipped in this manner.

A HANDY BABBITTING JIG

Some difficulty is experienced in obtaining babbitted bearings of uniform thickness on account of the variation in the shape of the shells. This has been overcome in Chicago through use of the scheme pictured on page 926. On two metal tables adjacent to the melting furnace are mounted four pairs of bearing cores for four sizes of bearings. At the sides of each of these iron cores are blocks against which the bearing shells rest as they are placed in position for pouring in the babbitt. These blocks are held in position by strap springs so that the shell may be brought closer to the core than the position obtaining as it comes in contact with the blocks, by forcing them against the spring supports.

The thickness of the bearing is thus kept uniform by measuring from the core to the outer edge of the shell and forcing the latter to the position giving the correct dimension. The shell is brought to and held in this position by a hand screw which bears against the back of the shell and is supported in a yoke at the front of the table. This yoke is hinged to the center of three iron posts and rests in a slot in either of the two others. After the babbitt in one shell has been poured it is permitted to cool while the workman is getting a shell in place on the other core of the pair. The yoke is then loosened and swung over to the other outside post and tightened against the shell on this core to bring it to the right position. The babbitt is then poured. While this is cooling the other bearing is removed from the mandrel and a new shell put in place, and by that time it is possible to loosen the yoke and swing it over, repeating the cycle. This makes the work a practically continuous performance without lost time and insures a uniform bearing thickness at a minimum cost.

EFFECTIVE AIR RESERVOIR SUPPORT

A new way of hanging the air reservoirs was recently devised in connection with the fifty new trailers now under construction in the West Side shops. At each end of the tank, where the lap of end and side sheets makes double thickness of metal, a band is brazed to the tank, the band extending half way around, with the ends bent out horizontally. After the bands are brazed on, the tank is hot galvanized inside and out. It is supported under the car floor by two U-shaped pieces, which are bolted to the wood cradle above and to the tank bands below, with the U's opening sideways toward the tank. These support connections are turned this way rather than with backs toward the tank to avoid a narrow place between them and the tank in which dirt and water could accumulate.

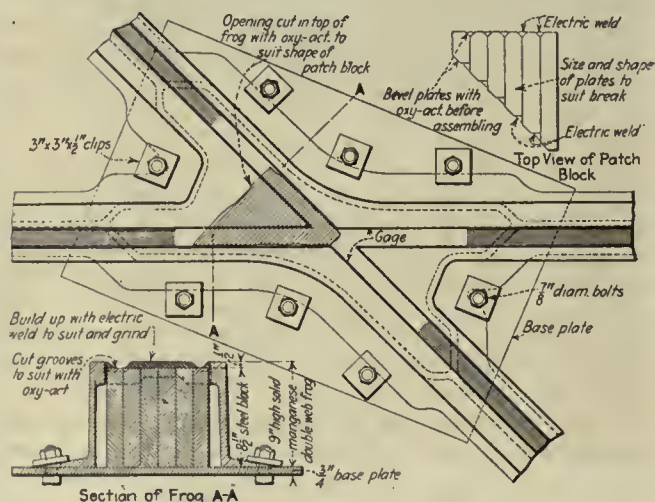
With the old system of hanging tanks by means of bands fastened to the cradle and extending around the tank, but not fastened to it, there is a strong tendency for failure to occur under the bands because of the slight movement between tank and bands and the possibility of water and dirt getting underneath the bands to help corrosion and erosion. With the bands brazed on tight all of this is eliminated and the life of the tank undoubtedly extended.

Broken Manganese Frogs Repaired Without Interrupting Traffic

Solid Plugs Which Were Supported on Steel Plates Inserted Between the Frog and the Ties Were Used to Build Up the Break

TWO manganese girder rail frogs of the box or double web type, at the intersection of Sutter and Market Streets, in San Francisco, recently broke without warning, leaving the crossing in an unsafe condition and likely to do considerable damage to rolling stock or further damage to the crossing itself. Despite the heavy traffic at this part of the system equipment and materials were assembled as soon as the break was discovered and the rebuilding of the two frogs was completed the same day without taking the crossing out of service.

In double web frogs of this type, when a section of the top breaks out, the open space beneath makes it impossible to build up the break in the usual manner because of the absence of any foundation on which to build. It was therefore decided to replace the broken sections with solid plugs, supporting them on steel plates which could be inserted between the frog and



METHOD OF REPAIRING BROKEN WEARING SURFACE OF SOLID MANGANESE FROG

the ties for this purpose. These base plates were made of $\frac{3}{4}$ -in. metal about 2 ft. x 3 ft. in size and bolted clips were used to clamp frog and plate rigidly together. Eight of these clips were placed around the flange of each frog, as shown in the accompanying illustration.

A triangular shape was selected as the easiest form of plug to build up and a right-angled triangle was measured off on each of the frogs, the size and location being chosen so that when the plug was in place it would give the maximum strength to the broken sections. The dimensions of the larger plug are shown on the accompanying illustration. The plugs were built up of steel plates, the desired shape and exact size being secured by beveling the edges with an oxyacetylene torch and by welding adjoining plates together along the joints. When the plugs had been delivered to the job, the exact dimensions of the openings required in the frogs were marked out and after the base plates were set the holes were cut out with the oxyacetylene torch. With the plugs in place an electric weld was made entirely around the joints between plug and frog,

and finally the entire job was smoothed up with the rail grinder. The plug rested on the base plate without being attached to it in any way.

After the two plugs installed in this way had been in service for a few days, it was almost impossible to tell which of the several frogs at this particular crossing had been repaired.

The work was carried on under the general direction of B. P. Legare, chief engineer maintenance of way and construction, United Railroads.

Hedley Addresses Cornell Engineers

Interborough President Draws on His Personal Experience in Order to Illustrate His Advice to Young Men Who Are Ambitious to Succeed

THE speaker at a meeting of the Cornell Society of Engineers, held in New York City on April 21, was Frank Hedley, president and general manager of the Interborough Rapid Transit Company. Some of his remarks were referred to editorially in the issue of this paper for April 30. This association is made up of former Cornell students in all branches of engineering and Mr. Hedley gave them the benefit of his practical experience, beginning in England, where as a boy he learned the fundamentals of steam railroad shop work.

After some general introductory historical remarks regarding electric railway development before he became interested in it, he told of his first practical work in the Erie Railroad shops, in Jersey City, soon after his arrival in this country. He said that after two years with the Erie he secured work in the New York Central shops in Forty-third Street, New York City, where at that time was an old roundhouse just north of the Grand Central Station. Here he had a very interesting experience while working in a shop gang as machinist. He said that each gang foreman had three engines to look after, and on one occasion his gang had two of its three engines ready, but was waiting to have the valves set. The gang foreman was ill and the master mechanic was about to lay off the rest of the men until his recovery because he supposed that there was no one who knew how to set the valves. Young Hedley, however, had been keeping his eyes open and he volunteered to set the valves. He was permitted to do this and did the job successfully, but when a short time afterward he asked for the same pay as the foreman got his request was turned down with the statement that it was impossible to pay him more than the maximum rate of 24 cents per hour.

Discouraged by this limitation on his earning capacity young Hedley left the New York Central and secured a job as machinist in the Ninety-eighth Street shops of the Third Avenue Elevated Railroad. Here his knowledge of valve setting caused a repetition of the New York Central experience, but this time, after a stormy encounter with the gang foreman, he came out ahead and was himself made foreman. It was only a short time until he became master mechanic of the West Side Elevated Railroad, and in 1889 he became master mechanic of the Kings County Elevated Railroad in Brooklyn. Here he had charge of engines and cars; he inaugurated railroad service and remained with the company until 1893, when he went to Chicago with the contractors who were building the Lake Street Elevated Railroad.

In Chicago Mr. Hedley was general superintendent of construction on the Union loop and the Northwestern

Elevated Railroad and he gained a great deal of operating experience as well, because Charles T. Yerkes, president of the road, left much of the administration to him.

Mr. Hedley said he came back to New York in 1903, first with the construction company, later organizing the operating forces of the Interborough Rapid Transit Company. Still later he was put in charge of the street railways as well.

Referring to some of the things that have occurred in the rapid transit development in New York City, Mr. Hedley spoke of the original large motors which were employed on account of their great accelerating ability, although the operation was far from ideal. He could see that while in the early stages of operation by electricity this operation was not as satisfactory as that with the old steam locomotives, yet the goal of ultimate success was always in sight. A great deal of money had to be spent in rebuilding and redesigning, and the operating department worked very close to the manufacturers' designers, because the latter had to get many pointers from the former. Development went along very rapidly, so that today the operators feel absolute confidence in the electrical equipment.

This, of course, said Mr. Hedley, involves a high standard of inspection and maintenance. The Interborough today does its inspection on a mileage basis, in connection with periodical lubrication. Motor cars make 1,200 miles before they are laid up. They are then taken in for oiling and adjustment, carbon brushes are fixed up, brakes tightened, etc. There are no terminal inspections.

Mr. Hedley explained that as a result of careful inspection rapid-transit trains frequently operate for thirty days at a stretch without developing a single interference with train movement on account of defective inspection or defective equipment. He described a number of the wonders of the subway equipment, and called attention to the fact that the motor cars of one of the ten-car subway trains have more apparatus in them than any steam locomotive ever constructed. Moreover, they have a horsepower capacity that can produce tractive effort sufficient to accelerate the trains at the rate of 1.7 m.p.h. per second. This is about three times as rapid as is possible with the best steam locomotive attached to the best passenger train in the country. In spite of the perfection of this equipment, Mr. Hedley thinks that there is still a wide field for electrical development and that the surface has as yet only been scratched. We are, he said, just in the beginning of electrical engineering, and there is a tremendous field for the young engineer who is resourceful.

Interspersed with the technical part of Mr. Hedley's discourse were a number of observations regarding life and living. For example he said that the best way in which to make a living is to be able to produce, and to be able to convince the other fellow you know how to produce; that is, how to run the business that he needs to have run. Then you can make him pay you well for running it. Again, it is not absolutely necessary for a man to have a technical college education. But this one thing is necessary, if he doesn't get his technical education in college, he must get it after he starts to work. And it is very difficult to get a technical education, night after night, after putting in hard work in the shop. The principal thing is that any one who starts out, no matter what his education, must, in order to be successful, show that he can do things a little better than some one else. Such a man cannot be held back.

Testing Insulating Materials—I*

There Are Certain Fundamental Characteristics Which All Insulating Materials Must Have to Meet the Operating Conditions—
The Presence of These Characteristics Is Determined by Certain Tests as Described

BY JOHN S. DEAN

Railway Motor Engineering Department, Westinghouse Electric & Manufacturing Company

IN THE electrical industry the term "to insulate" means to separate conducting bodies by means of non-conductors so as to prevent a transfer of electricity. As applied to railway motors the function of insulating material is to act as a separator between adjacent commutator bars and turns of the copper conductors and to isolate from the ground these conductors, motor leads and wiring connections around the frame.

The variety of insulating materials used in the construction of a railway motor is shown in detail in a chart published in the April 19, 1919, issue of the *ELECTRIC RAILWAY JOURNAL*, page 778. These materials primarily take the form of either a liquid, paper, cloth, cord or a solid and are segregated and classified in Table I.

TABLE I—CLASSIFICATION OF INSULATING MATERIALS

Liquids.....	Amber insulator Plastic insulator Asphaltum varnish Insulating varnish Shellac
Papers.....	<div> <div>Untreated.....</div> <div> Fish paper Asbestos Fullerboard Cement paper </div> </div> <div> <div>Treated.....</div> <div> Micarta Japanese paper and mica—mica tape Fish paper and mica </div> </div>
Cloths.....	<div> <div>Untreated.....</div> <div> Cotton tape Cotton sleeving Surgical braid Gray webbing Drilling </div> </div> <div> <div>Treated.....</div> <div> Treated cloth Friction tape Friction cloth Treated duck </div> </div>
Cords.....	<div> Torpedo twine Jute rope Linen twine </div>
Solids.....	Mica Porcelain Rubber bushings Impregnating gum Cement

The insulation of railway motors not only involves the separation of the various conductors and their isolation from ground but includes a number of other factors, such as the characteristics of the materials used and the methods of applying them to the various detail parts of the motor during the process of manufacture. Further, in the selection of this material it is essential to take into consideration the conditions under which railway motors have to operate, the most important of which are: (1) Comparatively high temperatures; (2) variable trolley voltages and line surges; (3) exposure to considerable moisture, dust and dirt; (4) subjection to severe mechanical strains and vibrations; (5) frequent abuse by rough handling; (6) poor



INSULATING MATERIALS FOR RAILWAY MOTORS

A—Asbestos paper	I—Asbestos tape	Q—Friction tape
B—Cotton sleeving	J—Friction cloth	R—Treated cloth
C—Linen twine	K—Jute rope	S—Shellacked fullerboard
D—Asbestos and mica	L—Cotton tape	T—Fullerboard strips
E—Fish paper cell	M—Treated duck	U—Fish paper U-pieces
F—Fish paper and mica	N—Mica tape	W—Surgical tape
G—Cement paper	O—Treated lineo tape	Y—Drilling hoods
H—Torpedo twine	P—Gray webbing tape	

maintenance, in many cases; (7) ruggedness of construction and accessibility and convenience for repair.

From the standpoint of dielectric strength, glass stands highest among the non-conductors of electricity, but its use for insulating purposes is limited on account of its brittleness. It is not used in any form on railway motors, but has been applied quite extensively and has proved invaluable in certain fields of electrical work.

To meet the above conditions satisfactorily the insulating materials for railway motors must have attention with respect to: (1) Dielectric strength, (2) mechanical strength, (3) flexibility, (4) moisture, acid and oil proofness, (5) heat resistance, (6) heat conduction and radiation, (7) cementing and sticking qualities and (8) suitable finish.

The above properties cannot be had combined in any one insulating material, hence a great variety of individual untreated materials and combinations of treated and composite materials are required. These must be selected for different details of the motor, depending upon the mechanical and electrical strains to which the various parts are subjected and the method of applying during the process of manufacture. Under these conditions a great variety of tests of the untreated materials, the materials used during the process of treatment and of the treated and built-up materials are necessary to insure the proper insulation of the completed machine.

Some of the most important tests which experience has shown are required in connection with this variety of insulating materials are given in Table II to show the refinement necessary in producing a railway motor

*This is the first of two articles by Mr. Dean on the testing of insulating materials. In the April 16 issue of this paper Norman Litchfield described the essential characteristics that should be specified for insulating materials. This and the following article describe methods and apparatus used for determining these characteristics.

correctly insulated that will finally pass the specified factory tests and at the same time stand up under the severe operating condition to which it is subjected in service.

To test the mechanical strength of cotton tape, cotton sleeving, surgical tape, gray webbing, drilling, treated cloth, friction tape, friction cloth, treated duck, torpedo twine, jute rope and linen twine, an automatic power cloth tester, having a capacity ranging from 50 to 300 lb., is used. Test specimens of cloth are cut 1 in. wide and about 6 in. long and samples of tape and cord are cut 6 in. in length. The test strip of sample material is clamped in the jaws of the testing machine, which are 2 in. apart, and power is applied through a motor-driven worm. The pull

is clamped in the machine over a plunger which is forced up against it by means of a hand-operated pump. When the paper is ruptured the gage pressure is read and recorded. Fish paper such as is ordinarily used in built-up mica wrappers shows a rupture test of about 40 lb.

During the process of manufacturing micarta insulating material it is necessary to select a paper that will take up a certain definite amount of shellac during treating. To determine the degree of porosity, a glass burette graduated from 0. to 100 cu.cm., over a length of 22 in. of the tube, is used, together with two steel clamping disks with a 1-in. hole in the center and a



No. 1—Apparatus used in making tensile tests on tapes, cloths and cords. No. 2—Apparatus used in making rupture tests on papers. No. 3—This apparatus is used in testing the strength of cements.

MAKING TENSILE STRENGTH AND RUPTURE TESTS OF CLOTHS, PAPERS AND CEMENTS

or breaking point in pounds is registered on an indicating scale attached to the upper clamping jaw of the machine. Tests are made on a number of samples and an average value is taken as the final result.

A test made on five samples of cambric such as is used in making treated cloth shows the following:

Test No.	1	2	3	4	5
Warp.....	50	52	40	41	42 = 45 lb., average
Woof.....	22	27	24	31	29 = 27 lb., average

The warp represents the thread running lengthwise in a woven material, while the woof is the name given to the threads carried by the shuttle; *i.e.*, those running crosswise of the fabric.

To determine the comparative strength of the various papers used for winding cells, U-pieces and for foundations for built-up mica wrappers, etc., a Mullen testing machine having a capacity of 100 lb. pressure is used. The test specimens are cut 3 in. square from the commercial rolls of paper. The test piece of paper

125-cu.cm. glass flask. The flask is connected to the lower end of the burette by means of a flexible rubber

TABLE II—TESTS ON ELECTRIC RAILWAY MOTOR-INSULATING MATERIALS	
Untreated materials	Tensile test Rupture test Air porosity test Pulling test Destruction test Creepage test
Materials used in treating	Drop point test Viscosity test Dielectric test—liquid insulating materials Penetration test Aging test Oil proof test Acid, alkali and salt water test Cementing and sticking qualities test Heat conduction and radiation test Baking or drying qualities Weather test
Treated and composite materials..	Adhesion test Slip test Treating test specimens Dielectric test—sheet insulating materials Moisture absorption test Gaging built-up mica board Dielectric test—built-up mica and paper Experimental treating power

tube. To the top of the burette is connected the lower clamping disk and this connection is fitted with a pinch cock. Test specimens are cut $2\frac{1}{4}$ in. wide lengthwise from the sheets of paper to be tested.

In the test the pinch cock is opened and the flask is placed on the upper ring support opposite the zero on the burette and filled with water until the flask and burette are filled up to the zero graduation on the burette. The test strip of paper is then clamped between the two steel disks and the pinch cock is closed. The flask is then lowered to a position which brings the water level of the flask $2\frac{1}{4}$ in. below the zero mark on the burette and the pinch cock is opened for ten

$\frac{1}{2} \times 1$ in., an equivalent of one-half square inch, at the point of fracture.

The test is made by placing the sample in the jaws of the testing machine and applying the power through a system of levers, which are balanced for the grade of material under test. The pulling force applied to the upper jaw is automatically adjusted by a transfer of small shot from one receptacle to another. As the shot fall into the retainer on the spring balance they are weighed, registering the pull. When the sample breaks, the transfer of shot is automatically shut off and the maximum recorded pull is read from the dial on the scale. In determining the durability of rubber bushings used to protect the motor lead cables where they come out through the frame of the motor, a spe-



No. 4—Insulating gums are tested to determine the softening at different temperatures. No. 5—Viscosity of insulating varnishes is determined by a viscosimeter. No. 6—Rubber bushings are tested to destruction.

TESTING INSULATING GUMS, VARNISHES AND RUBBER BUSHINGS IN THE LABORATORY

seconds to allow the air to flow into the burette through the sample of paper. The pinch cock is then closed and the flask is raised until its water level coincides with that of the burette and this level is read on the burette. This gives the number of cubic centimeters of air drawn into the burette. This figure is taken as the porosity number. Each strip is tested at intervals of 5 in.

A good grade of Kraft paper such as used in connection with the manufacture of micarta for railway motor parts has a porosity figure of from 40 to 50.

Cements for railway motor construction are used primarily in back of the commutator neck to seal up the openings around the windings and are put in place in a plastic condition and allowed to harden. The apparatus used for testing these is a Riehle cement testing machine.

Test specimens are made up in a special shape, so as to fit into the jaws of the testing machine. They are molded from the cement and have a cross-section of

cial intermittent compression testing machine is used. The test rubber bushing is placed in an upright position between the two horizontal parallel plates of the testing machine and the height of the lower plate is adjusted to get a predetermined compression of the bushing when the plates are nearest together. The motor is started and this raises and lowers the upper plate intermittently, compressing the sample about sixty times a minute.

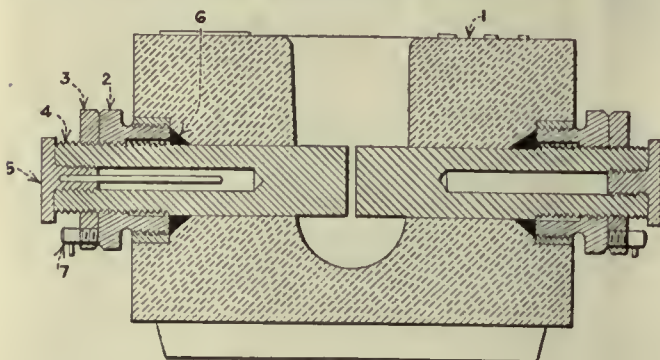
A recording speed indicator is attached to the driving shaft of the machine, which registers the total number of compressions. The sample specimen is tested until it shows signs of destruction. This test gives comparative results as to the suitability of the various grades of rubber bushings.

Porcelain insulators used on railway motor brush holders are tested to determine the ability of the insulator to resist any electrostatic discharges over the surface of the porcelain. The equipment used is similar to the apparatus (which is explained in detail later on)

used to make the dielectric test on sheet insulating material.

The porcelain insulator is placed on a metal rod and a small bare copper wire is twisted around the middle of its outer surface. One side of the testing circuit is connected to the metal supporting rod and the other side is connected to the copper wire on the porcelain. The test voltage is raised until a flash-over occurs across the surface of the porcelain, blowing the breaker. The maximum voltage is read and recorded at the flashing point.

To determine the softening, at different temperatures, of insulating gums such as are used in impregnating railway motor field coils it is important to use a grade of gum that will not soften and run out of the windings under the most severe operating conditions of the motor. The apparatus used in testing gum for this quality consists of two glass beakers, one within the other, and a glass tube to receive a thermometer to which a small platform of aluminum is attached on the outside to hold the test sample of gum. A small telescope is used in noting the various readings. The test specimen is molded in a metal mold and has the following dimensions: Total length 2 in.; width $\frac{1}{2}$ in. for 1 in. of the length, while the other inch tapers



TEST CUP USED IN DIELECTRIC TEST OF LIQUID INSULATING MATERIALS

from $\frac{1}{2}$ in. down to $\frac{1}{8}$ in. at the end. The thickness of the test piece is $\frac{1}{8}$ in. The $\frac{1}{8}$ -in. square tip of the wedge is painted white to increase its visibility. In the test the wedge is placed with the 1-in. tapered end overhanging on the platform attached to the glass tube which is placed in the inner beaker. Glycerine is poured in the outer beaker and heated by an electric stove so regulated as to raise the temperature in the inner beaker at the rate of 2 deg. C. per minute. Observations are made and recorded of the "sag point," which is the temperature at which the test piece begins to bend; the "bottom point," which is the temperature at which the test piece touches the bottom of the inner beaker $2\frac{1}{2}$ in. below the platform, and the "drop point," which is the temperature at which the overhanging test column breaks.

To determine the viscosity or the internal friction of the various grades of insulating varnishes a Stormer viscosimeter is used. In this the outer beaker is filled with water, which is changed from time to time to maintain the test varnish in the inner beaker at a uniform temperature of 21 deg. C. The test varnish, which is taken at the specific gravity used in the factory, is placed in the inner beaker. A small metal cylinder, which is immersed in the test varnish, is rotated due to the action of the force of gravity on a 100-gram weight connected to it through a system of

pulleys and gears. The pointer on the scale of the apparatus is set to zero and the time required to make 100 revolutions of the cylinder is taken as the viscosity figure. This apparatus is sometimes used to record the number of revolutions the cylinder makes in one minute.

The results of a test on insulating varnish such as is used in railway motors show a viscosity figure of 25, which interpreted means 100 revolutions of the drum are made in twenty-five seconds using a 100-gram weight.

To determine the dielectric strength of oils and varnishes the same testing circuit as used in making the dielectric test on sheet insulation material is used. The testing board with the brass terminals is replaced by a standard oil testing cup developed for this purpose.

The test cup, which is shown in detail in one of the illustrations, is adjusted by spacing the electrodes $\frac{1}{16}$ in. apart. The cup, after being carefully cleaned with benzine or gasoline, is filled with the test varnish to within $\frac{1}{2}$ in. of the top. After being filled it is allowed to stand until all air bubbles have disappeared. The terminals of the testing circuit are connected to the binding posts on the test cup, and the voltage is applied first at a low value and then increased at the rate of 3,000 volts per second until the oil in the cup is punctured and a breakdown occurs. During the test the temperature of the varnish is kept at from 20 to 25 deg. C. Five tests are made on the sample varnish and the average of these five voltage readings is recorded as the dielectric strength of the varnish.

To determine the ability of the various grades of varnish to penetrate the fibrous structure of the various grades of cloth used for insulating purposes two glass tubes, $\frac{1}{2}$ in. inside diameter and 12 in. long, open at both ends, are used. These are held in an upright position in a frame which is fitted with a clamping arrangement to hold a number of layers of cloth against one end of the tubes, which are filled with the varnish to be tested. To make the test the test tubes are closed with corks and then filled with the two grades of varnish to be tested. Over each of the upper ends of the tube, which are open, are securely clamped to the same thickness 100 layers of cotton cloth cut $2\frac{1}{2}$ in. square. The apparatus is then up-ended, the corks are removed to give ventilation and the varnish is allowed to soak into the cloth for fifteen minutes. The corks are then placed in the tubes, the apparatus is reversed, the samples of cloth are removed and the number of layers penetrated are counted, which is a measure of the penetrating qualities of the two varnishes. In making this test it is important that both samples should have the same dilution and temperature, as these characteristics affect the penetration figure. This test is only comparative, but it is a good index as to the most suitable varnish to meet these requirements.

Finds Good Painting Pays

THE Chattanooga Railway & Light Company has decided that the old way of painting and varnishing cars thoroughly is after all the best. After trying various kinds of less expensive paints and after experiments with the use of enamel, the management has come to the conclusion that the best final results are obtained by removing everything, starting at the bottom, and putting on seven coats of body paint and two coats of best varnish on top of this. This is naturally more expensive as far as first cost goes, but in the long run there is greater satisfaction and less annual cost over a period of years than by some substitute methods.

Equalized Brakes and Braking Power*

Methods of Obtaining Equalized Brakes on Cars Equipped with Various Types of Brake Rigging Are Described and Examples Solved for Braking Power, Percentage of Braking Power and Total Leverage

By H. M. P. MURPHY

AS ALL practical designs of foundation brake riggings must be properly "equalized" the following definition of an equalized brake will assist in making this term clear: An equalized locomotive or car brake is one which is designed so that, during a brake application, equal forces will be delivered to all brake shoes which are applied to wheels carrying equal weights and performing similar duties, regardless of shoe wear, variable piston travel, etc.

As an illustration of the preceding definitions, consider the air brake portion of the standard car brake

according to the definition. The reasons for employing different degrees of shoe pressure on wheels which do not carry equal weights or which do not perform similar duties will be fully discussed later under the head of "Braking Power," etc.

GETTING EQUALIZED HAND BRAKING ON CARS EQUIPPED WITH EQUALIZED AIR BRAKE RIGGINGS

When a foundation brake rigging is so designed that the air brake portion is equalized the hand brake portion will also be equalized if the hand brake chain, or

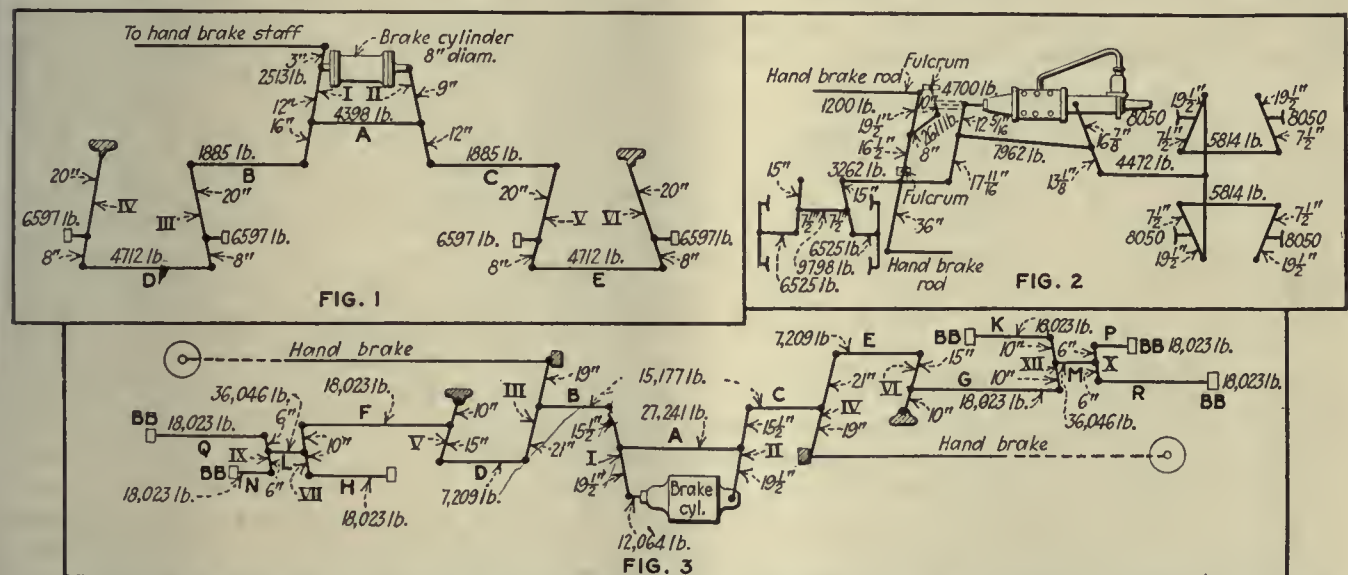


FIG. 1—BRAKE LEVERAGE DIAGRAM FOR DOUBLE-TRUCK FOUR-MOTOR CAR. FIG. 2—BRAKE LEVERAGE DIAGRAM FOR CAR WITH MOTOR AND TRAILER TRUCKS; 32,200 LB. ON MOTOR TRUCK AND 14,500 LB. ON TRAILER TRUCK. FIG. 3—BRAKE LEVERAGE DIAGRAM FOR CAR WITH SIX WHEEL TRUCKS

rigging shown in Fig. 1. It will be observed that this brake is fully equalized because the forces delivered to each of the four brake beams are always equal to each other, and each pair of wheels not only carries the same weight but also performs the same duty and should, therefore, be braked with just the same force as each of the other pairs of wheels on the car. As another illustration, consider the brake rigging shown in Fig. 2. In this case there are two distinct classes of wheels, i.e., drivers and trailers, which not only perform different duties but also carry different weights. Consequently, although the forces delivered to all of the shoes concerned are not equal, the brake rigging must not be assumed to be of the non-equalized type. In fact, as the forces delivered to each of the four driver brake shoes are equal to each other, and as the forces delivered to the trailer shoes are always equal to each other, the brake rigging is properly equalized,

rod, is attached to any one of the air brake levers at some point which constitutes a fixed center during an application of the air brake or if the attachment be made to the push rod pin of the cylinder lever. If, however, the hand brake chain, or rod, be attached to any other point of any of the air-brake levers the hand brake will not be equalized.

In order to illustrate the preceding rule, consider the brake rigging shown in Fig. 3. In this case the hand-brake chains, or rods, are connected to air-brake levers at points which constitute fixed centers during an application of the air brake and therefore as the air-brake portion of the rigging is known to be equalized the hand-brake rigging will also be equalized.

As a further illustration, it is apparent that the form of car hand brake shown in Fig. 1 is not equalized, for by inspecting this it will be observed that the hand-brake-chain rod is connected to the cylinder lever at a point 3 in. beyond the push rod pin center. In general, the greater the distance between these two points the farther will the hand brake be from the

*This is the fifth of a series of articles on forces developed in brake riggings. Others appeared in the Jan. 15, Feb. 19, March 19 and April 16 issues of this paper.

equalized type. Consequently it is important to make the dimension referred to as small as possible, 3 in. being the maximum distance that should be used. The proper construction is, of course, that in which the push rod and hand brake chain rod are attached to the same pin.

In order to ascertain just what inequality of braking force results from the use of the improperly connected hand brake referred to in the preceding paragraph and illustrated in Fig. 1, let it be required to find the force delivered to each of the four brake beams when a pull of 1,200 lb. is exerted on the hand-brake chain.

Considering the middle point of lever *I* as the fulcrum,

$$\text{Force on rod } B = \frac{1,200 \times 15}{16} = 1,125 \text{ lb.}$$

and, considering the lower end point of lever *III* as the fulcrum,

$$\text{Force on brake beam of lever } III = \frac{1,125 \times 28}{8} = 3,938 \text{ lb.}$$

and by finding the force on rod *D*, the force on the brake beam attached to lever *IV* is also found to be 3,938 lb.

Now the force on rod *A* may be found by considering the lower end point of lever *I* as the fulcrum, thus:

$$\text{Force on rod } A = \frac{1,200 \times 31}{16} = 2,325 \text{ lb.}$$

and by considering the upper end point of lever *II* as the fulcrum,

$$\text{Force on rod } C = \frac{2,325 \times 9}{21} = 996 \text{ lb.}$$

and considering the lower end point of lever *V* as the fulcrum,

$$\text{Force on brake beam of lever } V = \frac{996 \times 28}{8} = 3,486 \text{ lb.}$$

and the force delivered to the brake beam of lever *VI* may also be shown to be equal to 3,486 lb.

Thus it is seen that owing to the specified method of attaching the hand-brake chain to the cylinder lever the hand brake is not properly equalized, the force delivered to each of the brake beams of the left-hand truck being 452 lb. greater than the force delivered to each of the beams of the right-hand truck, under the conditions assumed. However, as this variation in braking force is not excessive, the given method of connecting the hand brake with the main leverage system is generally considered as satisfactory. Moreover, although the hand brake in question is not equalized, attention should be called to the fact that in a preceding example it was shown that the air-brake portion of the apparatus is equalized.

BRAKING POWER OR BRAKING FORCE DEFINED

The term total braking power or total braking force simply means the total force (in pounds) with which the brake shoes, on the wheels considered, are forced against the tires.

As braking power must obviously depend not only on the design of the foundation brake rigging and on the size of the brake cylinder but also on the air pressure existing in the brake cylinder it is always essential to specify the "cylinder pressure" considered when discussing the subject of braking power. In cases where a hand brake is the source of power the force applied to the hand wheel should be stated whenever the subject of braking power is involved.

The term "percentage of braking power" means the ratio of the total braking power, on the wheels con-

sidered, to the total weight with which these wheels press on the rails; that is, to find the percentage of braking power, in any case, divide the total braking power by the total weight on the wheels in question and multiply this result by 100, in order to express it in the form of a percentage.

It is also clear that in this case the "brake cylinder pressure" must always be specified, for the percentage of braking power depends on the total braking force, which, as previously pointed out, is directly dependent on the air pressure existing in the brake cylinder. Consequently it is customary to state that a car is braked at a certain per cent of its weight when the "cylinder pressure" has some specified value, or to say that the percentage of braking power on a particular car is a certain amount, based on a specified cylinder pressure.

The preceding definition may be expressed in the following mathematical form, if the cylinder pressure is clearly stated:

$$\text{Percentage of braking power} = 100 \times \frac{\text{total braking force on specified wheels}}{\text{total weight on specified wheels}}$$

The term "total leverage" represents the number of times that the total force, exerted on a specified brake cylinder push rod, is multiplied in being delivered to all of the brake shoes controlled by the cylinder in question, or, in other words, the total leverage, for any given case, simply represents the total number of pounds of brake shoe pressure obtained for each pound of force developed by the push rod of the brake cylinder concerned.

To determine the value of the total leverage for any given brake rigging, connected with a specified cylinder, divide the total braking force developed on all of the beams or shoes controlled by the cylinder by the corresponding total force exerted on the cylinder push rod.

This rule may be concisely stated in the following mathematical form:

$$\text{Total leverage} = \frac{\text{total braking force developed by specified cylinder}}{\text{total force on push rod of specified cylinder}}$$

In using the preceding rule, neither the size of the cylinder nor the amount of air pressure need be known, as the total braking force developed may always be found in terms of the total push rod force. In other words, as the term "total leverage" simply represents the force-multiplying ability of a brake rigging, it is dependent only on the design of the rigging and is in fact a constant quantity for any given set of levers or other force-multiplying devices. Consequently when computing total leverage the force exerted by the cylinder push rod may be assigned any convenient value whatever. Particular attention should, moreover, be called to the fact that in all cases it is essential to consider each cylinder with the brake rigging controlled by it alone as a separate and independent system. This is a most important factor in all total leverage problems, but especially in the case of a car or locomotive which is equipped with more than one brake cylinder.

In order to illustrate the methods outlined in the preceding paragraphs for the computation of braking power, percentage of braking power and total leverage, the following examples are of interest:

Consider the brake rigging illustrated in Fig. 1 and let it be required to find the total leverage for this case. As the magnitude of the push rod force does

not affect the value of the total leverage of any given brake rigging and, therefore, as any force whatever may be assumed as acting on the push rod, it is generally considered best to employ a force of 1 lb. unless the total braking force has previously been computed by the use of some greater value for the push rod force. Consequently, let it be assumed, in this case, that a force of 1 lb. is delivered by the cylinder push rod to the upper end of lever I, then to find the total braking force developed by the cylinder (*i.e.*, the total braking force on the whole car, as all of the brake beams are controlled by the specified cylinder) consider the middle point of lever I as the fulcrum and apply the "General Leverage Rule," thus:

Force on rod B =

$$\frac{(\text{force on push rod}) \times (\text{lever arm of force on push rod})}{\text{Lever arm of force on rod B}}$$

$$\text{Force on Rod B} = \frac{1 \times 12}{16} = \frac{3}{4} = .75 \text{ lb.}$$

Also by considering the lower end point of lever III as the fulcrum,

$$\text{Force on brake beam of lever III} = \frac{.75 \times 28}{8} = 2.625 \text{ lb.}$$

Now by continuing this method throughout the system, the force acting on each of the three remaining brake beams will also be found to be equal to 2.625 lb., and, therefore, the total braking force developed by the push rod force of 1 lb. is $4 \times 2.625 = 10.5$ lb., that is, 10.5 lb. of brake shoe pressure are developed by each pound of force exerted on the cylinder push rod, and consequently the total leverage is 10.5 (see definition of total leverage). If, however, it is desired to apply the rule for determining total leverage when the total braking force and corresponding total push rod force are known, it may, of course, be accomplished thus:

$$\text{Total leverage} = \frac{10.5}{1} = 10.5$$

It will be noted that in the preceding example neither the size of brake cylinder nor the cylinder air pressure were considered, the solution depending only on the proportions of the levers and the number of brake beams (*i.e.*, the number of pairs of brake shoes) but, of course, this problem could have been solved by assuming a definite size of brake cylinder and definite degree of cylinder pressure; thus with the brake rigging shown in Fig. 1 and with an 8-in. diameter cylinder and an air pressure of 50 lb. per square inch, the total force on the push rod is 2,513 lb. and the force delivered to each of the four brake beams of the rigging illustrated is 6,597 lb. Consequently the total braking force developed on the whole car is $4 \times 6,597 = 26,388$ lb., whence by aid of the rule for computing total leverage,

Total leverage =

$$\frac{\text{total braking force developed by specified cylinder}}{\text{total force on push rod of specified cylinder}}$$

$$\text{Total leverage} = \frac{26,388}{2,513} = 10.5$$

From the preceding discussions it is clear that the value of the total leverage for any given brake rigging may always be computed by first assuming that either a force of 1 lb. or any other specific value is exerted on the cylinder push rod, thereby calculating the resulting forces delivered to each of the brake beams or shoes controlled by the cylinder in question, and finally by dividing the sum of all of these last mentioned forces by the assumed force on the push rod.

Suppose now that the car, on which the brake rigging

shown in Fig. 1, is installed, weighs 35,000 lb. and let it be required to find the percentage of braking power on this car when a brake cylinder pressure of 50 lb. per square inch is developed.

As shown in the preceding discussion the total braking force (or braking power) on all of the specified wheels (*i.e.*, for the whole car in this case) is equal to 26,388 lb. when an 8-in. cylinder is used and the air pressure is 50 lb. per square inch. Consequently,

$$\text{Percentage of braking power} = 100 \times \frac{\text{total braking force on specified wheels}}{\text{total weight on specified wheels}}$$

$$\text{Percentage of braking power} = 100 \times \frac{26,388}{35,000}$$

$$= 75.4 \text{ per cent (based on 50-lb. cylinder pressure)}$$

As an additional example consider the American equalized driver brake rigging illustrated in Fig. 4

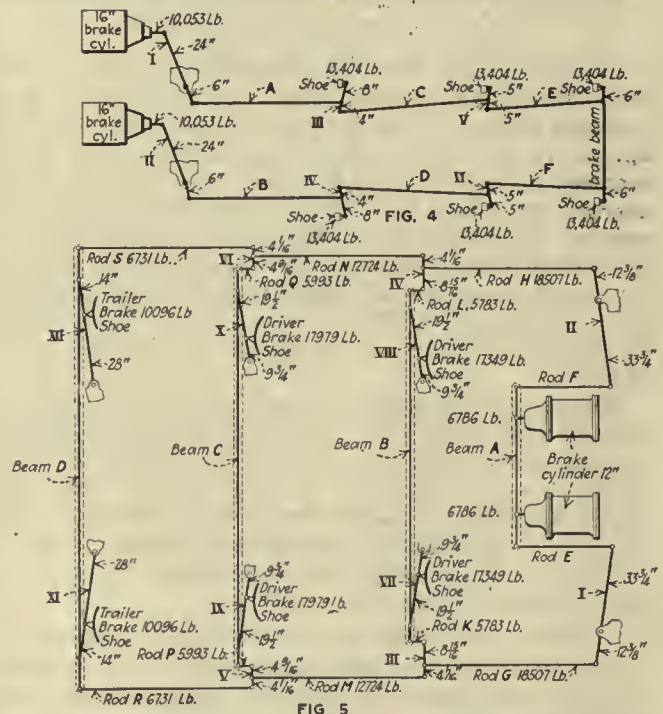


FIG. 4—LEVERAGE SYSTEM FOR AMERICAN EQUALIZED DRIVER BRAKE. FIG. 5—AMERICAN EQUALIZED BRAKE APPLIED TO ATLANTIC TYPE LOCOMOTIVE

and let it be required to find the total leverage and the percentage of braking power when two 16-in. diameter cylinders are used and the air pressure is 50 lb. per square inch, the total weight on the drivers being 107,000 lb. The total braking force on each shoe is 13,404 lb. and therefore the total braking force on all six shoes is $6 \times 13,404 = 80,424$ lb. Consequently,

$$\text{Percentage of braking power} = 100 \times \frac{80,424}{107,000}$$

$$= 75.2 \text{ per cent (based on 50-lb. cylinder pressure)}$$

Now in determining the total leverage, for this case, where two brake cylinders are used, it is merely necessary to consider each side of the engine as a separate system, which it really is, and to find the total shoe pressure developed by each cylinder alone. By referring to Fig. 4 it is seen that each cylinder controls three shoes (*i.e.*, the shoes on one side of the engine), the total shoe pressure developed by one cylinder is, therefore, $3 \times 13,404$, or 40,212 lb., and as the force acting on the push rod of either cylinder is 10,053 lb.

$$\text{Total leverage} = \frac{40,212}{10,053} = 4$$

In each of the preceding examples it happened that the weights of the cars and locomotives were approximately evenly distributed on all of the wheels considered, but it should be pointed out that this is not always the case; for instance, on cars with maximum traction trucks there is much more weight on each of the drivers than on the trailer wheels, and consequently the shoe pressure on these two classes of wheels will not be the same although the same brake cylinder is used for both. This makes no difference, however, in figuring the total leverage and total braking force, but when calculating the percentage of braking power care should be taken not to confuse the average percentage on the two classes of wheels with the specific percentage on each separate class, as these are not necessarily the same.

EXAMPLES OF DIFFERENT PERCENTAGES OF BRAKING POWER ON DRIVERS AND TRAILERS

In order to illustrate the statements just made, consider the leverage system shown in Fig. 5, which is a standard form of the American equalized brake as applied to an Atlantic type of locomotive. Let it be required to find the total leverage, total braking force, average percentage of braking power and specific percentage of braking power for the drivers and trailers, when each brake cylinder is 12 in. in diameter and the air pressure is 60 lb. per square inch. The total weight on the drivers is 78,500 lb., which is evenly distributed on the four wheels, and the weight on the trailers is 28,000 lb.

Under the given conditions the total force exerted on each cylinder push rod is 6,786 lb. and the resulting braking force developed on each of the two forward driver shoes is 17,349 lb., while on each of the rear driver shoes the braking force is 17,979 lb. The braking force developed on each of the trailer shoes is 10,096 lb. Consequently the total braking force for the drivers and trailers is equal to

$2 \times 17,349 + 2 \times 17,979 + 2 \times 10,096 = 90,848$ lb.
or the total braking force developed by each cylinder on either side of the locomotive (i.e., on two drivers and one trailer) is equal to 45,424 lb., and, as the total force on each brake cylinder push rod is 6,786 lb.

$$\text{Total leverage} = \frac{45,424}{6,786} = 6.7$$

Now to find the average percentage of braking power it is, of course, merely necessary to divide the total braking force, 90,848 lb. for the drivers and trailers, by the total weight on the drivers and trailers and to multiply this result by 100, the total weight being $78,500 + 28,000 = 106,500$ lb., thus,

$$\text{(Average) per cent of braking power} = 100 \times \frac{\text{total braking force on four drivers and two trailers}}{\text{total weight on four drivers and two trailers}}$$

$$\text{(Average) per cent of braking power} = 100 \times \frac{90,848}{106,500} = 85.3 \text{ per cent (based on 60-lb. cylinder pressure)}$$

Also as the total braking force on the trailers is equal to $2 \times 10,096 = 20,192$ lb.

$$\text{(Specific) per cent of braking power on trailers} = 100 \times \frac{\text{total braking force on two trailers}}{\text{total weight on two trailers}}$$

$$\text{(Specific) per cent of braking power on trailers} = 100 \times \frac{20,192}{28,000} = 72.1 \text{ per cent}$$

(Based on 60-lb. cylinder pressure) and as the total braking

force on the drivers is equal to $2 \times 17,349 + 2 \times 17,979 = 70,656$ lb.

$$\text{(Specific) per cent of braking power on drivers} = 100 \times \frac{\text{total braking force on four drivers}}{\text{total weight on four drivers}}$$

$$\text{(Specific) per cent of braking power on drivers} = 100 \times \frac{70,656}{78,500} = 90 \text{ per cent (based on 60 lb. cylinder pressure)}$$

Thus, it is seen that in order to get a correct idea of the true percentage of braking power it is necessary to consider each set of wheels separately, when the braking force applied to each is unequal and the weight of the car or locomotive is unevenly distributed.

In the preceding example, the percentages of braking power on the drivers and trailers were not the same, but in many cases, although the weight of the car or engine may not be evenly distributed on all of the wheels, the same percentage of braking power is used on all wheels; that is, the force with which the shoes are pressed against each pair of wheels bears a uniform ratio to the weight upon them.

DETERMINING TOTAL BRAKING FORCE WHEN TOTAL WEIGHT AND PERCENTAGE OF BRAKING POWER ARE SPECIFIED

By referring to the definition of "percentage of braking power," it will be observed that, by transposing the members of the typical equation there given, a very useful rule for the determination of total braking force may be readily obtained and stated as follows:

To find the total braking force developed on a given set of wheels by a specified cylinder pressure, divide the corresponding percentage of braking power by 100 and multiply the quotient thus obtained by the total weight on the wheels in question.

This rule may be stated in the following concise mathematical form for any given cylinder pressure and specific set of wheels:

$$\text{Total braking force} = \frac{\text{Percentage of braking power}}{100} \times (\text{total weight})$$

In order to illustrate the preceding rule, let it be required to find the total braking force developed on a car weighing 40,000 lb. when the cylinder pressure is 50 lb. per square inch and the corresponding percentage of braking power obtained on all wheels is 60 per cent.

To solve this problem apply the rule, thus:

$$\text{Total braking force on car} = \frac{(\text{percentage of braking power})}{100} \times (\text{total weight of car})$$

$$\text{Total braking force on car} = \frac{60}{100} \times 40,000 = 24,000 \text{ lb.}$$

Now let it be required to find the total braking force developed on the trailer wheels of an Atlantic type locomotive, when the total weight on these wheels is 30,000 lb. and the brake cylinder pressure is 50 lb. per square inch, the corresponding percentage of braking power obtained being 60 per cent.

To solve this problem, apply the rule, thus:

$$\text{Total braking force on trailers} = \frac{(\text{percentage of braking power})}{100} \times (\text{total weight on trailers})$$

$$\text{Total braking force on trailers} = \frac{60}{100} \times 30,000 = 18,000 \text{ lb.}$$

A most important consideration connected with the subject of braking power is the marked variation in the percentage of braking power which always results from

the loading or unloading of a car. Of course, the greater the total weight of a car, equipped with a specified design of foundation brake rigging, the smaller will the percentage of braking power be for any given cylinder pressure. (See definition of percentage of braking power.) In order to show how great a difference exists between the percentages of braking power obtained on empty and loaded cars, the following example will be given.

A car weighing 46,000 lb. when empty is braked at 60 per cent with 50-lb. cylinder pressure. Let it be required to find the percentage of braking obtained on this car when it carries a load of 92,000 lb. and all other conditions remain unchanged.

In order to find the percentage of braking power developed, it is, of course, necessary to ascertain the total weight of the car when loaded and the total braking force developed under the specified conditions. These quantities may be found as follows:

Total weight = (weight of empty car) + (weight of load)
Total weight = 46,000 + 92,000 = 138,000 lb.

and as the percentage of braking power obtained on the empty car (which weighs 46,000 lb.) is 60 per cent, the total braking force developed by the specified cylinder pressure of 50 lb. may be determined by the rule given in the preceding paragraph, thus:

Total braking force on car =
$$\frac{(\text{percentage of braking power})}{100} \times \text{total weight}$$

Total braking force on car =
$$\frac{60}{100} \times 46,000 = 27,600 \text{ lb.}$$

whence, by referring to the definition of percentage of braking power,

Per cent of braking power on loaded car =
$$100 \times \frac{\text{total braking force on specified wheels}}{\text{total weight on specified wheels}}$$

Per cent of braking power on loaded car =
$$100 \times \frac{27,600}{138,000}$$

= 20 per cent (based on 50-lb. cylinder pressure)

Although the method outlined in the preceding paragraphs is perfectly general, a much shorter method for obtaining the same results may be stated as follows:

When the percentage of braking power, developed by a certain cylinder pressure, is known for a car of given weight, to find the percentage of braking power obtained on the same car under similar conditions, but with a new specified total weight, multiply the known percentage by the given original weight and divide this product by the new specified total weight.

This rule may be expressed in the following concise mathematical form:

Per cent of braking power with new total weight =
$$\frac{(\text{per cent of braking power with original weight}) \times \text{original weight}}{\text{new total weight}}$$

To illustrate the use of this simplified rule, let it be required to solve the example given in the preceding paragraph by its aid. The necessary data are as follows: Original weight (of empty car) = 46,000 lb., new total weight (of car and load) = 138,000 lb., and percentage of braking power obtained with original weight (and 50-lb. cylinder pressure) = 60 per cent. The rule may now be applied thus:

Per cent of braking power with new total weight =
$$\frac{60 \times 46,000}{138,000} = 20 \text{ per cent (based on 50-lb. cylinder pressure)}$$

By referring to any of the braking power or leverage examples given in the foregoing, it will be readily seen that if, in each of the cases considered, the brake cylinder pressure had been doubled, the force with which each shoe was pressed against its wheel would also have been doubled, or that, if the brake cylinder pressure had been reduced to half of its given value, the force with which each shoe was pressed against its wheel would also have been reduced to one-half of its original value. In general it is true, therefore, that the shoe pressure varies in direct proportion to the brake cylinder pressure and consequently that the percentage of braking power also varies in direct proportion to the brake cylinder pressure. Now when computing braking force and percentage of braking power it is often necessary to find the value of these quantities corresponding to various degrees of cylinder pressure, the following rule will, therefore, be found of much practical value in such cases.

If a known degree of braking force, or percentage of braking power, is developed by a given brake cylinder pressure, the value which either of these quantities will have, when a new specified brake cylinder pressure is employed as a basis, may be found by dividing the given braking force, or percentage of braking power, by the original cylinder pressure on which it is based and then multiplying the quotient thus obtained by the new cylinder pressure on which the required braking force, or percentage of braking power, is to be based.

This rule may be concisely stated in the following mathematical form:

Total braking force based on new cylinder pressure =
$$\frac{(\text{original total braking force})}{(\text{original cylinder pressure})} \times (\text{new cylinder pressure})$$

Per cent of braking power based on new cylinder pressure =
$$\frac{(\text{original per cent of braking power})}{(\text{original cylinder pressure})} \times (\text{new cylinder pressure})$$

To illustrate this method let it be required to find the (specific) percentages of braking power and total braking forces for the drivers and trailers of the Atlantic type of locomotive considered in the former examples connected with Fig. 5, when the brake cylinder pressure is 50 lb. per square inch, it having been previously shown, in the examples referred to, that with 60-lb. cylinder pressure, the total braking force on the trailers is 20,192 lb. and on the drivers 70,656 lb., while the percentage of braking power obtained on the trailers is 72.1 per cent and on the drivers 90 per cent.

By noting that the "new cylinder pressure" is 50 lb. and the original cylinder pressure is 60 lb. in this case and applying the rule the desired results may readily be obtained as follows:

For trailers: Per cent of braking power based on 50-lb. cylinder pressure =
$$\frac{72.1}{60} \times 50 = 60.1 \text{ per cent}$$

For drivers: Per cent of braking power based on 50-lb. cylinder pressure =
$$\frac{90}{60} \times 50 = 75 \text{ per cent.}$$

For trailers: Total braking force based on 50-lb. cylinder pressure =
$$\frac{20,192}{60} \times 50 = 16,827 \text{ lb.}$$

For drivers: Total braking force based on 50-lb. cylinder pressure =
$$\frac{70,656}{60} \times 50 = 58,880 \text{ lb.}$$

One-Man Rear-Exit Cars

Seattle Has Arranged Twenty-seven Large Two-Man Cars for One-Man Operation in Unique Way—The Seating Capacity Sixty—The Operators Have No Difficulty in Handling Them

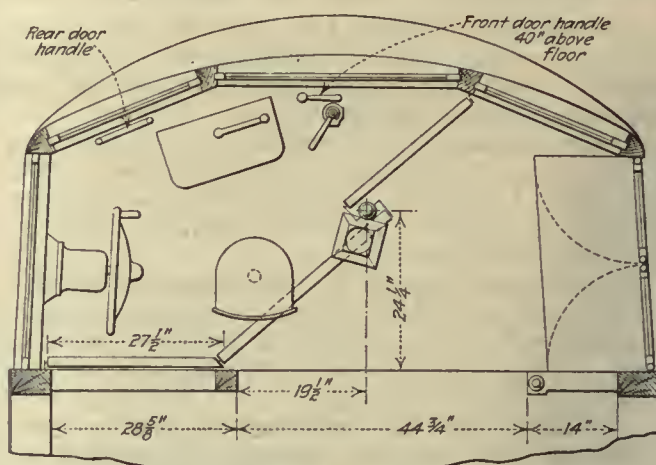
UNDER municipal operation, Seattle has extended one-man operation from safety cars to large double-truck two-man cars. This plan of operating some of the larger cars has been adopted with only slight changes in the arrangement of the cars, costing about \$100 per car. These changes included permanently closing the rear entrance-door and connecting the rear exit-door in such a manner that the operator at the forward end has control of it. This was accomplished by running a rod the entire length of the car just under the left-hand sill and making proper connections with the door levers underneath the car step. The motor-man's cab on the left-hand side of the front platform was removed, and the sand box formerly located therein was moved inside the car and placed under a seat. The bulkhead door at the front end was widened to 44 in., as shown in the accompanying drawing, which also shows the arrangement of fare box, curtains, etc. The controller, operator's seat and air valves were relocated as seen and air sanders, rear-door operating mechanism and a geared-wheel type of hand brake installed at the left of the operator.

In general, the plan embodied the changing of the single-end, rear-entrance and rear and front-exit two-man car into a front-entrance, rear-exit, single-end, one-man car. The following details and accompanying photographs will serve to indicate the type of equipment which has been converted for one-man operation:

Length over all.....	49 ft.
Width	8 ft. 7 in.
Length of body.....	38 ft. 6 in.
Truck centers.....	29 ft.
Seating capacity.....	60
Motors, 2 Westinghouse, 310-C	
Weight	40,360 lb.

Commenting on this scheme, D. W. Henderson, general superintendent of railways for the city of Seattle, said: "We converted twenty-seven cars of this type for one-man operation and they have been running since March 1, 1921. The trainmen are very well pleased with the car and we have had no complaints whatever from the public."

These large one-man cars have been in use on the "Ballard-North" and "Sixth Avenue, N. W.," lines dur-



LOCATION AND ARRANGEMENT OF EQUIPMENT ON FRONT PLATFORM OF CONVERTED ONE-MAN CAR

ing the last sixty days and for rush-hour as well as off-peak service. The former line handles about 177,000 passengers per month and the latter about 120,000, which gives some idea of the density of traffic. The average speed called for in the time-table was 8 m.p.h. in January, 9.06 m.p.h. in February and 8.93 m.p.h. in March. A few of these cars have also been operated on other lines where they were interspaced with two-man cars and they are reported to have given very satisfactory service.

Reclosing Circuit Breaker Gives Ideal Service

ON ONE of the lines in Cincinnati power distribution was found last summer to be rather weak. An analysis of the situation pointed out that what was really needed was a one-unit substation out on this line. It happened that the line ran near a carhouse and a 500-kw., 60-cycle rotary was placed in a room in a corner of the carhouse and equipped with an automatic reclosing circuit breaker which is manufactured by the Automatic Reclosing Circuit Breaker Company of Columbus, Ohio.

One of the carhouse men starts this rotary at 5 o'clock in the morning, sees that it is in good condition and leaves it for the rest of the day. This unit has been in service for about eight months now and has given continued satisfaction and perfect operation during the whole time.



DOUBLE-TRUCK SEATTLE CAR CONVERTED FOR FRONT-ENTRANCE, REAR-EXIT, ONE-MAN OPERATION

Destructive Effect of Current on Ball Bearings of Electric Cars

Tests Made Under Various Conditions Show that Very Rapid Destruction of Ball Bearings Results from the Electric Current Which Flows Through Them—Types of Construction Are Suggested for Overcoming the Trouble and Testing Apparatus Is Described for Reproducing Conditions as They Occur in Service

BY HILDING ANGSTROM

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DURING the past ten years various kinds of ball and roller bearings have been developed for use on electric railway cars and their equipment, both in America and in Europe. All of the bearings necessary for the operation of electric cars are subjected to very severe service caused by the movement of the cars on curves and at switches, by the forces developed when the brakes are applied and through the blows at rail joints. None of the anti-friction bearings developed has performed in the manner expected. In some cases the ball or roller retainer has been too weak. Sometimes the bearings have become "shelled" and destroyed due to the severe pounding action to which they are subjected. In some cases strength has been obtained at the expense of bearing friction.

Some of the bearings which have been tried in service in Europe are:

1. Svenska Kullagerfabriken, Gothenburg, Sweden.
 - (a) Spherical ball bearings, two per housing.
 - (b) Ball bearings with the outer ring turned cylindrical and radial bearings, one per housing.
 - (c) Radial bearings, two per housing.
 - (d) Spherical roller bearings, one per housing.
2. Nordiska Kullager Aktiebolaget, Gothenburg, Sweden.
 - (a) Radial bearings, two per housing.
 - (b) Disk bearings, two per housing.
3. Deutsche Waffenfabriks radial bearings in service on the tramways in Copenhagen, Denmark.
4. Jaeger-Bund-Rollenlager in service on the tramways in Dresden, Germany.
5. S. R. O. double-row radial bearings, Oerlikon, Switzerland, in service on the tramways in Berne and Zurich, Switzerland.
6. Delmez radial bearings, Brussels, Belgium.

In America several of the bearings mentioned above have been tried in actual service, and in addition experiments have been made with several types of American bearings.



EFFECT ON BALLS PRODUCED BY RUPTURING CURRENT PASSING THROUGH THEM

Fig. 1—Balls and retainers destroyed by action of current.
 Fig. 2—Appearance of balls when removed from retainer.
 Fig. 3—Shelling effect produced by arcing.
 Fig. 4—Rupturing effect produced by current of 260 amp.

Fig. 5—Balls after being tested with permanent steady load at varying current.
 Fig. 6—Effect on balls produced by rupturing current in air.
 Fig. 7—Effect on balls produced by rupturing current in oil.

When lightweight safety cars came into use, with higher scheduled speeds and increased rates of acceleration, the value of decreased friction to reduce the load placed on the motors while starting was considered an essential advantage. Tests have been made by the General Electric Company and the Union Actien-Gesellschaft among others to ascertain the destroying influence of current on friction bearings. From these tests it appears that a current as low as 1 amp. per square inch corrodes the housings and that a much smaller current will damage the bearing metal.

With ball bearings there is no insulating oil, as is the case with friction-type bearings, but there is an almost metallic contact.

DISTRIBUTION OF CURRENT IN BEARINGS

With the usual type of single-truck car the current passes from the trolley wheel through the controller and motors directly to the truck. The various motor bear-

insulated and with the motor lifted up from its suspension, so that the current could pass only through the axle bearings and the journal bearings.

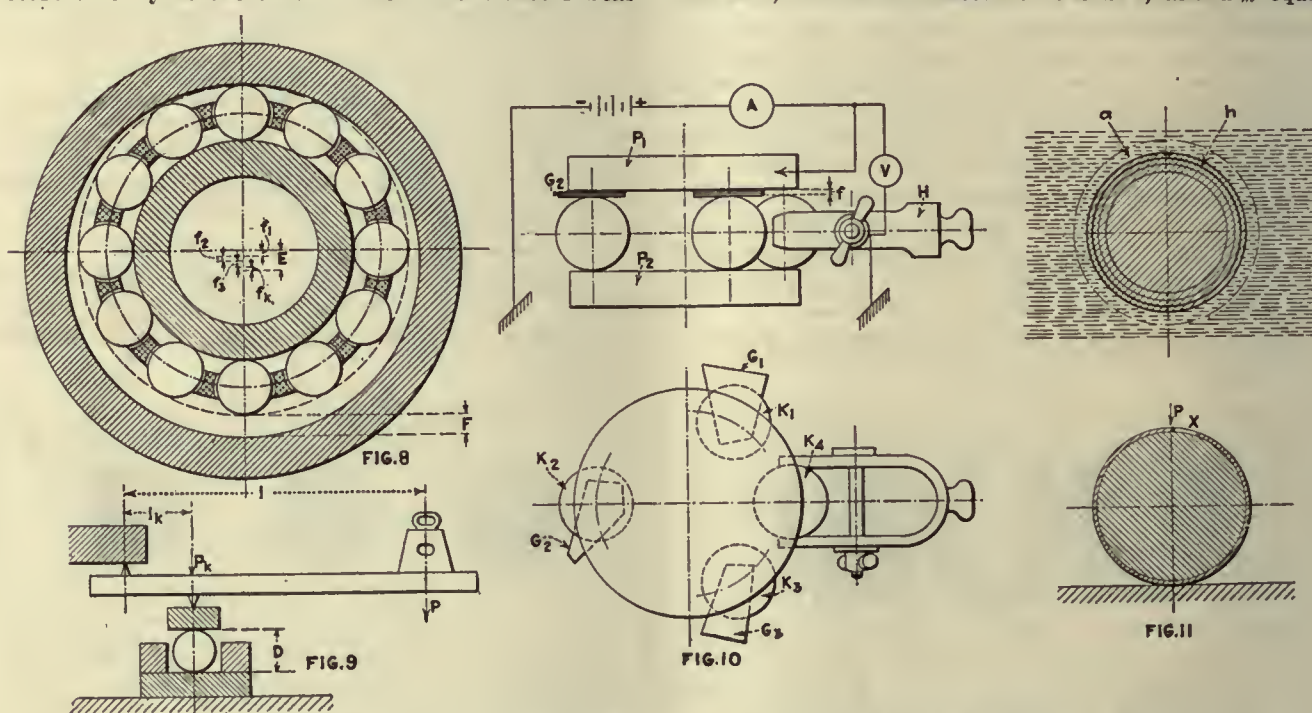
If we indicate the intermediate resistance of the two axle bearings by r_g and let r_k represent that for the journal bearings, we have

$$\frac{1}{R} = \frac{1}{r_g} + \frac{1}{r_k}$$

where R is the total resistance. In actual operation this value for the contact resistance is not quite correct, as the current passing through the ball bearings is in reality not a direct current but one of an alternating variety, with a frequency varying with the speed of the car. This frequency may be represented by

$$v = N \frac{D_m - d}{2 D_m}$$

where v is the frequency, N is the rotative speed of the axle, d is the diameter of the ball, and D_m equals



DIAGRAMS OF BALL BEARINGS AND APPARATUS USED FOR TESTING

Fig. 8—At left (top), diagram of wear on ball bearings.
Fig. 9—At left (bottom), arrangement for determining relation between pressure and contact resistance.

Fig. 10—Center, apparatus used for reproducing arcing from vibration.
Fig. 11—At right, hard layers and craters formed by current.

ings and the gearing are thus in the path of the current to ground. It may happen that in braking, where sand is applied, but one wheel may be in contact with the rail. In this case the current is divided between the axle bearings for one motor, the gearing and one journal bearing.

Assuming that the maximum circuit-breaker setting for a single-truck car is 225 amp., it is possible that this current under unfavorable circumstances may be divided between one journal bearing and the two axle bearings of the motor. In order to confirm this dividing of the current experiments were made with a car equipped with ball bearings. Three of the wheels of this car were insulated from the rails by mica sheets and but one wheel was left in contact. Current from a 550-volt trolley was then applied and the magnitude of the current was regulated through a water rheostat. The value of this current and the voltage drop were read between the ground side of the motors and the rail. This test was repeated with the brake connections

$D_i + d$ if D_i is the diameter of the inner ring. In this calculation, however, no consideration is given to the inductive resistance.

Results of this test showed that the resistance in a ball-bearing journal is about twice as great as the resistance in the two axle bearings of the motor. Of course, the ball-bearing resistance will be decreased by

TABLE I—TEST RESULTS ON BALLS WITHOUT LUBRICANT

Exp.	Amp.	Volt. Max.	Watt. Max.
a.	35	2.4	84
b.	80	3.1	248
c.	150	13.0	1,950
d.	225	11.0	2,475

greater load and will vary with the amount and quality of the lubricant used on the gears and with the condition of the axle bearings as regards wear.

In the following I shall show that it is not the permanent current load, but the effect of rupturing this current on the balls that produces the welding action.

Tests were made of the magnitude of the maximum rupturing effect. Results of these show that the rupturing effect is sometimes under unfavorable circumstances as much as 7 kw. and this is certainly sufficient to destroy ball bearings.

HOW RUPTURING EFFECT IS PRODUCED

When the balls and the inner and outer rings of the bearing are worn, and the upper balls are pressed together and the inner and outer rings compressed, it is possible that the journal bearing under unfavorable circumstances may be insulated from the bearing box. Such a condition is indicated in Fig. 8, which shows how this play between the balls and the inner and outer rings occurs. If we let f_1 represent the diametrical wear in millimeters of the outer ring, f_2 the diametrical wear in millimeters for the inner ring, f_3 the sum of the diametrical wear in millimeters of the two balls, and f_k the pressing together and the compressing of the upper ball, then

$$E = f_1 + f_2 + f_3 + f_k$$

The play due to the loading and unloading of the bearings and which causes the rupturing effect is evidently $E - f_k$, and practical examinations have shown that this may amount to 0.3 mm. (11.8 mils).

Figs. 1, 2 and 3 show some balls and bearings which have been thus destroyed. In Fig. 1 the balls are still in their retainer. The dark stains on the balls were formerly considered as having been caused by acid in the lubricant or from shelling through fatigue. In Figs. 2 and 3 the balls are shown after removal from their retainer. The shelling effect is quite evident in Fig. 3x. The concentric shelling shown in Fig. 3y was probably due to the formation of a small crater.

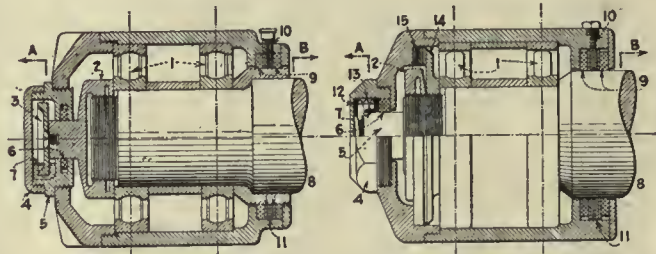
Additional experiments have shown that the current distribution among the balls depends to a large extent on the load placed on the balls and that it is the rupturing effect and not the permanent current due to metallic contact that has the most damaging influence on the durability of the balls.

An arrangement for determining the relation between contact resistance and load is shown in Fig. 9. A ball with a diameter of 36.5 mm. (1.44 in.) is placed between two plane disks, the upper loaded through the lever, as shown. The total length of this lever indicated by l is 1,598 mm. (5 ft. 2.96 in.) and l_k is 348 mm. (13.71 in.). This arrangement does not give the same

K_u was the same as the other balls. The average value for the thickness of the three mica disks should be the distance between the ball K_1 and the plane disk P_1 . By measurement this was found to be 0.29 mm. Direct current was then applied to the upper disk P_u , its value being measured by an ammeter A and the drop in potential between the upper disk and the ball K_1 was measured by a voltmeter V .

The ground for the circuit was connected to the vise H and by the raising first of the ball K_1 to make contact with the disk P_1 and then by the lowering of this ball into contact with the disk P_u an arc was established while readings of current and voltage were taken. Tests were made with four different strengths of current and the balls were changed after every reading. The voltage drop obtained and the maximum wattage is shown in Table I. Figs. 4 and 6 show the effect produced on the balls.

Other balls were then greased freely and the experiment was repeated. It was found that the rupturing effect was increased, but that it was more difficult to maintain the arc on account of the oil breaking it. Fig. 7 shows the effect on the balls in this latter test, and it will be noted that the size of the welded crater is reduced somewhat through the use of lubricant. The voltage and wattage obtained is shown by Table II.



JOURNAL BOXES FITTED WITH AUXILIARY CONTACTS FOR CARRYING CURRENT

Fig. 12—At left, double nut arrangement.
Fig. 13—At right, additional pressure provided by spring.

To illustrate the destroying effect that should be obtained on a ball bearing with a great load applied, let us consider the two balls shown in Fig. 11. The ball shown at the top of Fig. 11 has a hard layer h , which is thicker and more permanent when formed in oil than in water, due to the inferior ability of the oil to conduct heat. The surface layer of the ball as shown at the bottom of Fig. 11 has been pierced by the formation of a crater at z . The effect of the formation of such a crater is to subject the ball to a shearing or bending stress when a heavy load is applied instead of a compressive stress as would be obtained with a perfect ball.

To prevent damage to the balls through the passage of electric current some form of shunting device should be applied. The insulation of the outer ring of the ball bearing is possible, but does not appear advisable, as the repeated blows and shocks to which ball bearings are subjected would probably rupture or at least compress the insulating material, which would then produce additional stresses in the ball bearings. Tests have shown that the transmission of current through lubricated ball bearings may establish a galvanic element through the acids which the oil or lubricant may contain.

A shunt or auxiliary contact arrangement should be placed outside the ball or roller bearing casing and should have such a low resistance that it will practically exclude all transmission of current through the

TABLE II—TEST RESULTS ON BALLS WITH LUBRICANT

Exp.	Amp.	Volt. Max.	Watt. Max.
a.	27	1.8	48.6
b.	60	3.8	228.0
c.	90	3.2	288.0

contact resistance as would be obtained by the balls between their inner and outer rings in the ball bearings, but the relative proportion from different loads should be about the same. Fig. 5 shows the effect produced on balls by the current.

In order to produce in an artificial manner the current breaking which is supposed to take place in ball bearings, the apparatus shown in Fig. 10 was used. Between two plane disks P_1 and P_u were placed three balls K_1 , K_2 and K_u , each having a diameter of 36.5 mm. (1.44 in.). Three mica disks, G_1 , G_2 and G_u , were placed between the upper plane disks and the balls. The thickness of the mica disks was measured very accurately. A fourth ball, K_u , was then inserted and to this was screwed a vise H . The diameter of this ball,

balls or the rollers. The contact arrangement should also be constructed so that it will be easy to inspect.

A journal box fitted with N. K. A. disk bearings is shown in Fig. 13. This type of bearing has rollers which are self-centering, so that they tend to adjust their axis of rotation parallel to the axle of the wheel. The right-hand sides of the bearings shown in Figs. 12 and 13, which are marked *B*, show a current transmission arrangement that can be applied to new bearing boxes. This arrangement consists of two brass rings which bear against the collar of the wheel axle. These brass rings also serve to support the felt rings 9, against which they are pressed by means of a spring. To provide a better contact and a path of less resistance for the current, the space between the brass rings is filled with graphite or mercury. The conducting power of graphite is about 10^{14} times as great as that of oil, and it is thus evident that the use of graphite facilitates the transmission of current to a high degree. This type of box provides a path of low resistance for the current and at the same time gives a very tight construction against the entrance of sand or dust from the outside. The left-hand ends of Figs. 12 and 13 marked *A* show a contact nut arrangement which can be applied to old ball or roller bearing boxes. In general this type of construction corresponds to that just described. In Fig. 12A the current passes through the double nut at 4 and 5 to the graphite or mercury layer 7 and then to the contact disks 3, contact pin 2, and then to the axle of the wheel. In Fig. 13A the nut arrangement is simplified somewhat and the tightening ring has been made more effective by the use of a spring bearing on a brass contact disk 7. The path of the current in this construction is through the contact nut 4, the contact spring 12 and the contact disk 7 to the contact pin 5 and then to the axle of the wheel. These types of construction have been patented and are now in use on the tramways of Malmo, Sweden.

Make Bolster Trucks from Side-Bearing Types

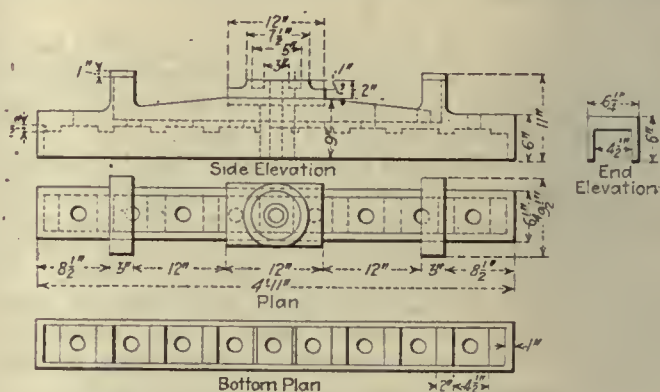
Old Side-Bearing Brill Maximum Traction Trucks Converted Into Bolster Type by the Georgia Railway & Power Company in Atlanta—Specially Designed Bolster Developed

THE Georgia Railway and Power Company, Atlanta, has several open cars which have been used only in intermittent service and they have been inclosing some of these open cars to put into regular daily service rather than extra service. These cars are equipped with Brill Eureka Maximum Traction Truck No. 22, side-bearing type, and the company did not consider this old style truck suitable for continuous service. Rather

than to buy new trucks, it tackled the problem of changing these trucks to bolster type, with completely satisfactory results. Some of these trucks have been in daily service practically two years and have developed no trouble. Eight or twelve more of these trucks will be changed over to the bolster type during the coming year.

In the change-over the company used only the former side bars, journal boxes, wheels, axles and springs of the old trucks, using the same motors, too, of course. It was naturally necessary to equip the trucks with newly designed brake rigging throughout and also to equip them with bolster, transom angles and with spring planks.

The bolster with which these trucks are equipped is a specially designed cast iron bolster, made in the foundry of the company in Atlanta. The accompanying drawing indicates the design and dimensions of this bolster, which is so constructed that the company was



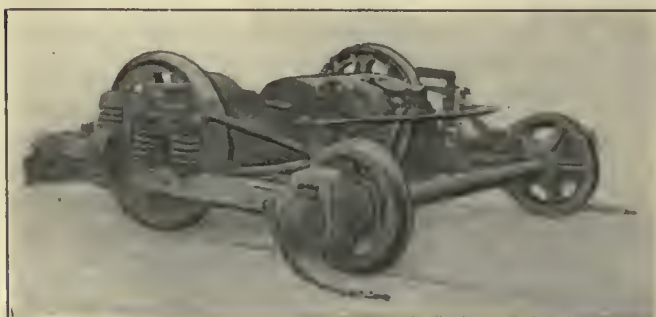
SPECIAL BOLSTER FOR REMODELED TRUCK

able to use the four coiled springs which were previously provided in the original truck to carry the car body. These springs are 7 in. long and have six turns of $1\frac{3}{8}$ -in. wire. The diameter of the coil at the top is $4\frac{1}{2}$ in. and at the bottom 5 in.

The bolster centers are 25 in. from the center of the small wheel axles and 23 in. from the center of the large wheel axles. Twenty-inch and 33-in. wheels are used. In the remodeled truck the motors are outside hung with nose suspension. The motors themselves are Westinghouse No. 68, with a gear ratio of 14 to 68.

The car bodies are some that were built by the company some twenty years ago. As remodeled, the total weight of the body, truck and equipment is 24,500 lb. There is seating capacity for forty passengers. The control on these cars is Westinghouse PK.

The total cost of remodeling these trucks has proved to be about \$300 per truck.



AT LEFT, OLD SIDE-BEARING TRUCK. AT RIGHT, REMODELED TRUCK AS BOLSTER TYPE

Data of New Interborough Turbine

**Water Rate of 11 Lb. per Kilowatt-Hour for 30,000-Kw. Turbine Shown by
H. B. Reynolds, Research Engineer Interborough Rapid Transit
Company, to Have Been Attained in Test—
Facts Contained in A. S. M. E. Paper**

IN A paper scheduled for presentation at the spring meeting of the American Society of Mechanical Engineers, to be held in Chicago, May 23 to 26, 1921, Herbert B. Reynolds, research engineer Interborough Rapid Transit Company, New York City, gives information regarding the several types of turbine which have been installed by that company during the past dozen years. He also includes the results of tests

in the photographs reproduced is but 26,250 kw., while that of the turbine in the foreground is 35,000 kw.

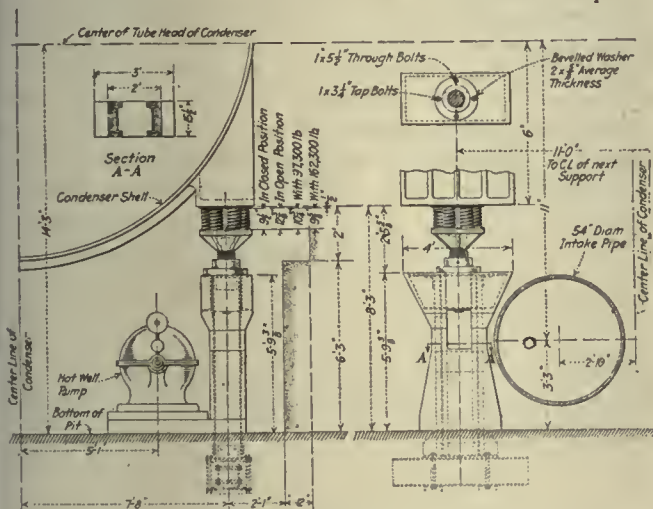
The three 30,000-kw. Westinghouse cross-compound turbines which were completed in 1915 were among the new units installed at the Seventy-fourth Street power station.

In the paper Mr. Reynolds gave structural and design details of the new turbines. Among other things, he said that they are of the straight Curtis impulse type, having twenty pressure stages, each consisting of one velocity stage. The normal steam pressure at the throttle is 225 lb. per square inch, abs., with a superheat of 150 deg. F., exhausting into a vacuum of 29 in. referred to a 30-in. barometer at 58.1 deg. F. The speed is 1,500 r.p.m.

In addition to the primary steam inlet, a secondary valve is provided which opens after the load reaches 24,000 kw. and which enables the turbine to carry a load of 35,000 kw. As all auxiliaries in the station are steam driven, a connection has been provided in the turbine through which any excess auxiliary exhaust steam may be injected. This is at the sixteenth stage of the turbine.

The generators are three-phase, star-connected, generating 25-cycle current at 11,000 volts. The excitation is at 250 volts. The generators are cooled by circulation of air maintained by a fan which forms an integral part of the generator. The air is drawn from the turbine-room basement and discharged from the top of the generator into the turbine room through a short stack.

Each unit comprises one single-shell two-pass Worthington condenser, two Worthington centrifugal circulating pumps, each driven through reduction gears by Kerr turbines; two Worthington centrifugal condensate pumps, each driven by a General Electric turbine, and one Laidlaw-Dunn-Gordon dry vacuum pump. Each condenser contains 50,000 sq.ft. of tube surface in

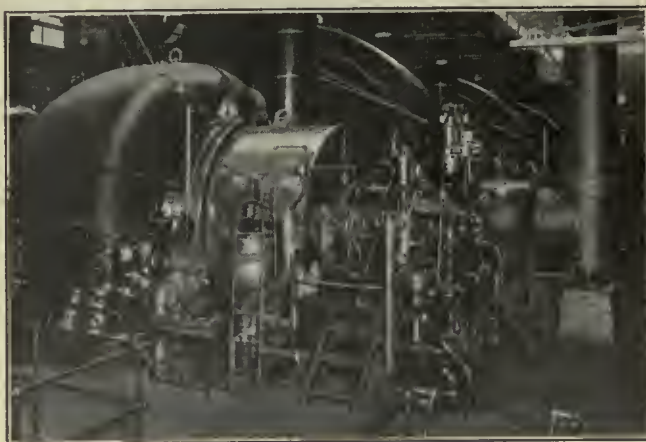


DETAILS OF THE SPRING SUPPORTS FOR THE CONDENSER

on the latest unit installed, namely, the three of 30,000-kw. capacity, the installation of which was completed during the past year.

Mr. Reynolds said that in order to provide additional power capacity for the new subways constructed in New York City during the period from 1913 to 1921, and operated by the Interborough Rapid Transit Company, additional turbine units were installed in both the Fifty-ninth Street and Seventy-fourth Street power stations. He reminded his readers that the original engine-room equipment of the Fifty-ninth Street power plant consisted of nine 7,500-kw. maximum capacity Manhattan-type Allis-Chalmers double-angle compound engine units and three Westinghouse 1,250-kw. turbines, the latter driving 60-cycle generators which supplied current for subway lighting. Later 25-cycle current was adopted for this lighting, the current being taken from the main units. During 1909 and 1910 five low-pressure 7,500-kw. maximum capacity General Electric turbine units were added, taking exhaust steam from five of the engines at atmospheric pressure.

Two of the new 30,000-kw units in the Fifty-ninth Street plant were installed in the space formerly occupied by the three lighting units, while the third turbine was installed at the western end of the station. The concentration of power possible with modern turbines is strikingly shown by the space they require as compared with that for reciprocating engines. The maximum capacity of the engines visible in the background

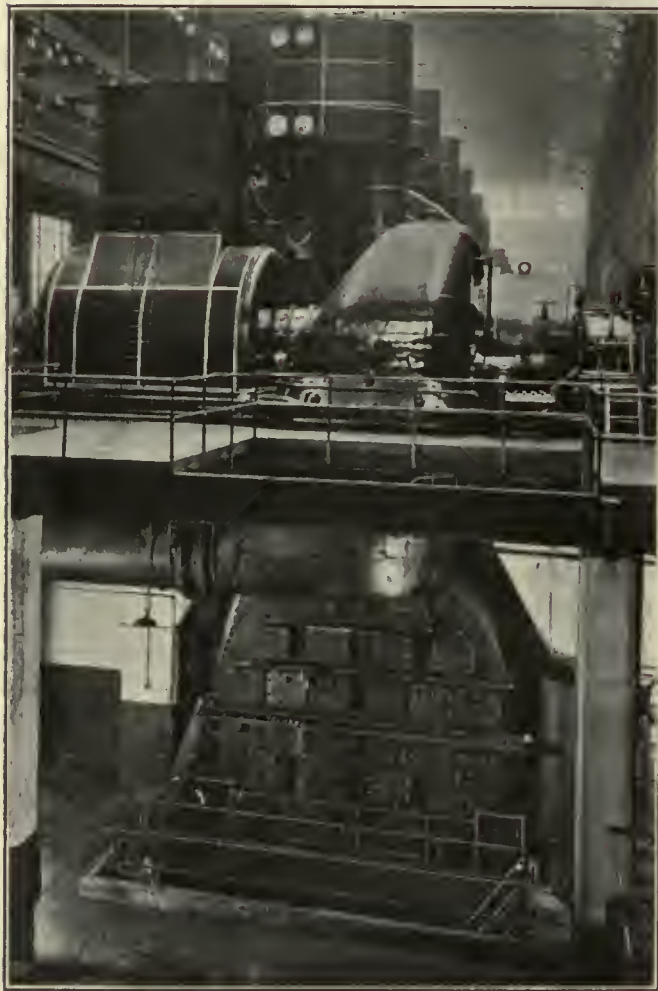


ONE OF THE THREE 30,000-KW. TURBINES INSTALLED
AT THE FIFTY-NINTH STREET POWER STATION
OF THE INTERBOROUGH RAPID TRANSIT
COMPANY IN 1920

10,760 tubes 18 ft. long, 1 in. in outside diameter and of No. 18 B. W. G. thickness. The condenser is of the two-pass type, the water entering at the bottom and passing out at the top. As the condensers are mounted on springs, rubber expansion joints are inserted in the circulating water lines.

ADJUSTMENT OF SPRING CONDENSER SUPPORTS

As no expansion joint was provided between the turbine and the condenser, it was necessary to mount the latter on springs, so as to provide for expansion and contraction. The spring supports are shown in one of the illustrations. To facilitate the setting of the springs and provide a means for detecting and adjusting



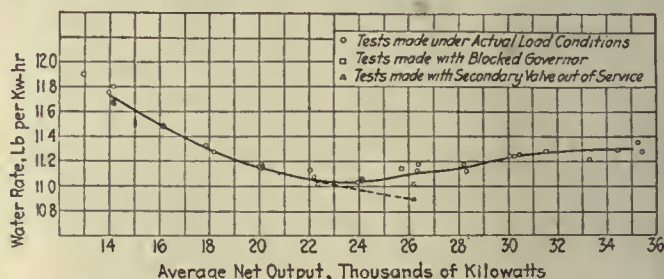
A COMPLETE TURBINE AND CONDENSER UNIT

for fatigue in them, hydraulic jacks were incorporated in the condenser supports.

Mr. Reynolds gave some detail of the procedure followed in setting these springs. He said that after the erection of the condenser and circulating water pipe had been completed, with the exception of making the joint between the condenser and the turbine, the condenser was raised while empty by means of the jacks, leaving $\frac{3}{4}$ in. clearance between the face of the turbine outlet and the face of the condenser inlet. The load on each of the four supports was then determined by noting the oil pressure in the jacks. It was decided that with the condenser empty and cold the downward pull on the turbine should not be less than approximately 17 tons. The distance that the joint between turbine and condenser would have to be pulled in order

to give this load was estimated from the modulus of elasticity of the turbine and condenser metal. The condenser was then raised to within the predetermined distance of the turbine outlet, which was found to be 0.231 in., after which the lock nuts on the jacks were screwed home and the condenser bolted to the turbine. The load on the springs was then determined with the condenser still empty by noting the pressure required just to raise the lock nuts. Every few months the load carried by the springs will be determined in this manner and compared with the load which existed when the condenser was first bolted to the turbine. Any fatigue which may develop in the spring will be compensated by screwing the lock nuts down.

It was found that the minimum condenser load carried by the turbine with the condenser shell empty was approximately 17 tons. As the water required to fill the condenser weighs about 60 tons the load on the turbine increases to 77 tons when the circulating water pumps are started. This is reduced to about 70 tons due to the compression of the springs under the expansion of the condenser during warming up. Immediately after shutting down, and while the condenser is still warm but drained, the load on the turbine is reduced to 10 tons. Thus, the condenser load on



WATER-RATE CURVE FOR NEW INTERBOROUGH RAPID TRANSIT TURBINE

Dotted line shows results that would probably have been obtained if steady-load tests had been conducted within this range of load where the secondary valve is continually opening and closing.

the turbine varies from 10 to 77 tons, out of a total condenser weight varying from 180 to 240 tons.

TESTS SHOWED HIGH THERMAL AND MECHANICAL EFFICIENCY

The equipment used for conducting the turbine tests consisted of two large water-weighing scales for measuring steam consumption, three single-phase rotating standard watt-hour meters for measuring the output, and the necessary thermometers, gages and mercury columns for determining temperatures, pressures and vacua. Most of the tests were of three-hour duration and, with the exception of a few special tests, the turbine was operated under conditions normal as to the type of load.

The results of the tests, in so far as the water rate is concerned, are given in the accompanying curve. The lowest rate obtained while operating under normal conditions was 11.03 lb. per kilowatt-hour. The thermal efficiency, or ratio of the output to the energy in the steam, was 25 per cent. The Rankine efficiency; that is, the ratio of the energy developed to that available within the working range of temperature and pressure, was 75.5 per cent.

In the paper the results of various auxiliary tests were also given, but it is impossible to summarize these within the space limitations of the present abstract.

Railway Valuation in Connecticut—I*

Procedure in Assigning Values to "Inside Plant" Property of a \$50,000,000 Railway System

BY ARCHER E. KNOWLTON

Instructor in Electrical Engineering, Yale University

THE regulation of public utility rates has in most contested cases called for such evidence of physical value of the utility property as appeared to be obtainable only through detailed inventory and valuation. This demand for valuations has come from all three of the parties to regulation, the public, the public utilities and the public utilities commissions. Occasionally sworn statements of utility executives or of disinterested experts have been acceptable, but once a valuation is demanded for rate purposes usually nothing short of minutely detailed inventory and appraisal suffices. Adherence on the part of the commissions, with their quasi-judicial status, to the rules of evidence as laid down by the courts has been a large factor in requiring these elaborate valuations. This, in a measure, has been excusable, considering the ever-present possibility of appeal to the courts from the commissions' decisions.

There is ample basis, however, for questioning the necessity of incurring the expense of making a minutely detailed valuation, and the trend seems to be toward recognition of these negating factors and even in some quarters to concede that proximate methods may result in adequate accuracy. Some of the aspects of recent physical valuations open to criticism are the cost, the length of time to complete, the element of estimate in fixing depreciation and other tangible overhead percentages, the uncertainty as to labor costs in connection with the multiplicity of small items, frequently the inflexibility of the summary as to rational apportionment of the total value among subsequent subdivisions of the property and, more frequently, the insignificance of sizable variations in the physical total as reflected in the rates for the service rendered.

The costs of valuations can hardly be called exorbitant when one observes that for a selection of the recent cases resulting in totals of eight and nine figures the services of the appraisers amounted to from 1.3 per cent to 6.6 per cent of the yearly return (at 6 per cent) on the fair value found. It may be urged that such a small item is negligible among the other constituents of the total needed receipts upon which the rate is fixed, but the same reasoning sanctions the employment of a proximate method of valuation the cost of which is only a fraction of that of a detailed appraisal. It is, however, the public, in its consuming, investing or tax-paying character, which pays the bill, and while only

IN THE VALUATION of railway property so much time and expense have been involved in most cases that a study of methods which will reduce these items to a minimum is worth while. In presenting this story of the valuation of the property of the Connecticut Company by the Public Utilities Commission of Connecticut, Mr. Knowlton, who serves as the electrical engineer to the commission, points out the philosophy of the commission and its engineers in their efforts to arrive at a fair valuation in moderate time, and at moderate expense. In this installment Mr. Knowlton shows the problem as a whole and tells how the "inside plant" and overheads were treated. In a subsequent installment he will develop the interesting unit-of-construction or "yardstick" bases of valuation for outside plant, which was the largest factor in saving both time and expense.

—EDITORS.

recently laws have gone into effect specifying in great detail how values shall be arrived at, there is evident today a tendency to attach less importance to the strictly physical valuation and more to such factors as the value of the service, or even the mere prevention of an operating deficit.

The time taken to make a physical valuation has often been the cause of long delays in rendering decisions on rate changes, and by the time they are reported conditions in the industry may have undergone abrupt changes, especially during and since the war. Any procedure which will facilitate

early decisions is therefore much to be desired.

And again, in actual service the life of a rail bond is not wholly independent of that of the rail nor that of a cross-arm independent of the life of a pole. This feature, in conjunction with the mixture of past experience and future conjecture that establishes the depreciation percentage for each element of property, leads to totals which involve more uncertainty than is ordinarily attributed to a detailed valuation. Another element of uncertainty appears in the labor allowances in connection with the many small items, because, while individually small in themselves, in the aggregate they may result in considerable variations in the total. Incidentally, can any one know to as high a degree of precision the actual labor cost of installing a single trolley bracket as he can the cost of constructing a thousand-foot section of uniform completed bracket construction on wood poles?

Although the tendency has been to regard only the value of the entire connected systems in fixing rates, it is often desirable to be able to demonstrate that local rates are not unreasonable when viewed in the light of the fair value of the corresponding subdivision of the property. Unless precautions are taken the summary of a detailed valuation may not permit ready determination of the physical value for such a subdivision.

And, finally, considerable variations in the physical and fair values are usually possible without in themselves determining the rate. As an illustration, take a million-dollar railway which has an operating revenue of \$370,000 and operating expenses of \$300,000, with resulting net operating revenue of \$70,000. If operating expenses increase one-third, the operating revenues must rise to \$470,000 to provide the same net revenue as before. But if the fare originally was 5 cents, under the new conditions 6 cents will not suffice and 7 cents will be necessary. In order that the fair value in itself should be the determining factor for either

*In two parts.

the 6- or 7-cent fare under the new conditions, the valuation total would have to be as low as \$635,000 or as high as \$1,685,000 as against the \$1,000,000 assumed. Of course these computations imply an undiminished traffic and the application of all net revenue toward interest on capital, but they indicate the extent of variations that are tolerable in the actual case.

PURPOSE AND BASIS OF THE VALUATION

The Connecticut General Assembly of 1919 directed the Public Utilities Commission to "investigate the

conditions under which the street railways of the state are operated and to report . . . such recommendations and suggestions with respect to legislation as it may deem proper and advisable in order to place such street railways upon a safe and efficient operating basis." But if the Legislature contemplated a valuation it must have been guided by some of the considerations advanced above in favor of an inexpensive tion it must have been guided by some of the commission in following the mandate deemed "it necessary to procure as accurate a valuation of the properties as possible," but added, "we are of the opinion that a reasonably accurate business-like valuation can be made with our existing force and facilities, supplemented by temporary assistance at moderate expense." In this manner the three engineers of the commission, E. I. Rudd, J. P. Wadhams and A. E. Knowlton, were directed to ascertain the cost of reproducing the 750 miles of street railway system under price conditions prevailing from 1910 to 1915. Likewise, the auditor and statistician, Edward Field, was directed to ascertain the actual investment or original cost to date of all the properties.

It was therefore not only imperative but also in keeping with the philosophy of the commission that the engineers, in ascertaining the reproduction cost of the railways, should devise a method which would entail a minimum of time and expense. At the outset it was recognized that if a detailed inventory were demanded it would be the extended portions of the property that would involve the greatest number of men and consequently the most time and expense. It was in the field work that most of the time and expense could be saved. Familiarity with the properties prompted the idea of treating as much as possible of the "way and structures" account by *applying computed costs of unit sections of an appropriate number of types of outside plant construction*. Some \$19,000,000 worth of railway property was valued by this procedure, the portions to which it was applied comprising the following (the numbers are those of the I. C. C. classification):

- 505-7, 510. Track and roadway construction.
- 511. Paving.
- 519-521. Electric line construction, poles and fixtures.
- 521. Feeder and distribution system.
- 544. Transmission system.
- 518. Telephones.
- 517. Signals.
- 507. Bonding.

Not only was economy in time and expense attained by this procedure, but it is believed that the results present advantages not always obtainable from the usual type of detailed valuation. The procedure, in a word, amounted to the establishment of "yardsticks" by means of which to measure the assembled construction as contrasted with a detailed count of elementary units without regard to their assembly. Some of the details of the procedure may interest the railway public and a technical discussion of this method will appear in a subsequent article.

PROCEDURE IN VALUATION OF ACCOUNTS TO WHICH UNIT-OF-CONSTRUCTION BASIS WAS NOT APPLICABLE

A map of the Connecticut Company's system, the principal one in the state, is shown herewith, and the total physical values for the various portions of the property are shown in the accompanying table, arranged according to the Interstate Commerce Commission ac-

CONNECTICUT COMPANY'S OWNED AND LEASED PROPERTY

Way and Structures		Appraised Value
501	Engineering and superintendence.....	\$1,556,182.23
502	Right of way.....	722,753.55
	Work done outside company area.....	397,200.00
503	Other land used in electric railway operations.....	1,485,845.61
	Land for parks and resorts.....	605,598.30
504	Grading.....	2,071,605.97
505	Ballast.....	9,858,741.18
506	Ties.....	
507	Rails, rail fastenings and joints.....	
510	Track and roadway labor.....	
508	Special work.....	1,408,709.00
	Electric switches.....	16,417.50
511	Paving.....	3,696,073.84
512	Roadway machinery and tools.....	93,252.69
515	Bridges, trestles and viaducts.....	1,285,138.25
516	Crossings, fence and signs.....	156,173.30
517	Signals and interlocking apparatus.....	86,723.06
518	Telephone and telegraph lines.....	41,820.28
519	Poles and fixtures.....	3,803,717.85
521	Distribution system.....	210,956.18
520	Underground conduits.....	2,035,084.87
522	General office buildings.....	143,240.00
523	Shops and carhouses.....	
524	Stations, miscellaneous buildings and structures.....	
525	Wharves and docks.....	35,911.00
526	Park and resort buildings.....	297,369.56
Total way and structures.....		\$30,009,014.22
Equipment		
530	Passenger and combination cars.....	4,780,800.00
531	Freight, mail and express cars.....	207,553.00
532	Service equipment.....	330,230.00
533	Electric equipment of cars.....	3,051,329.00
534	Locomotives.....	25,000.00
536	Shop equipment.....	267,687.75
537	Furniture.....	99,235.51
538	Miscellaneous equipment.....	62,347.86
Total equipment.....		8,824,161.12
Power		
539	Power plant buildings.....	686,820.00
540	Substation buildings.....	67,908.00
541	Dams, canals and pipe lines.....	90,000.00
542	Power plant equipment.....	3,654,000.00
543	Substation equipment.....	481,328.00
544	Transmission system.....	281,463.41
Total power.....		5,261,519.41
General and Miscellaneous		
546	Law expenditures.....	263,676.26
548	Insurance (injuries and damages).....	158,347.88
547	Interest one year.....	2,781,297.56
549	Taxes.....	
550	Promotion and organization.....	982,725.12
	Contingencies.....	1,838,240.20
	Working capital.....	500,000.00
	General stores and supplies.....	1,298,744.51
Total general and miscellaneous.....		7,823,031.53
Grand total.....		\$51,917,726.28
Land, buildings and equipment not used for electric railway purposes.....		378,864.52

CONNECTICUT COMPANY'S OWNED AND LEASED PROPERTY

Approved Value by Divisions			
Division	Total Computed Single Track, Miles	Total Appraised Value	Average Value per Mile
Stamford.....	22.571	\$991,169.04	\$43,913.39
Norwalk.....	24.144	1,259,463.42	52,164.65
Bridgeport.....	105.183	7,735,827.44	73,546.37
Derby.....	27.493	2,025,821.82	73,685.00
New Haven.....	150.987	12,269,957.62	81,265.00
Meriden.....	37.981	1,765,165.44	46,474.96
Waterbury.....	85.063	5,125,073.91	60,250.33
New Britain.....	33.485	2,050,356.80	61,232.10
Hartford.....	167.185	10,816,982.33	64,700.67
Middletown.....	20.470	988,025.09	48,266.98
Torrington.....	12.676	542,642.21	42,808.63
New London.....	89.920	4,548,496.65	50,583.82
Working capital, general stores and supplies.....		1,798,744.51	.....
All divisions.....	777.158	\$51,917,726.28	\$66,804.60

Above figures include under New Haven Division 7.426 miles of West Shore
Railway Company property and under Hartford Division 0.814 miles of
Manchester Electric Company's trolley property.

count numbers. Those accounts which were dealt with on a unit-of-construction basis have already been listed and there is given below a brief description of the means and method of assigning values to the remaining accounts.

501. *Engineering and Superintendence*.—The value allowed for this expenditure was obtained by taking 5 per cent of accounts 504-526, 539, 541, 544, 550a, 550b (largely way and structures items excepting land) and, in addition, 1 per cent of accounts 502, 503, 530-538, 542, 543, 550d, 550e (principally land and equipment items).

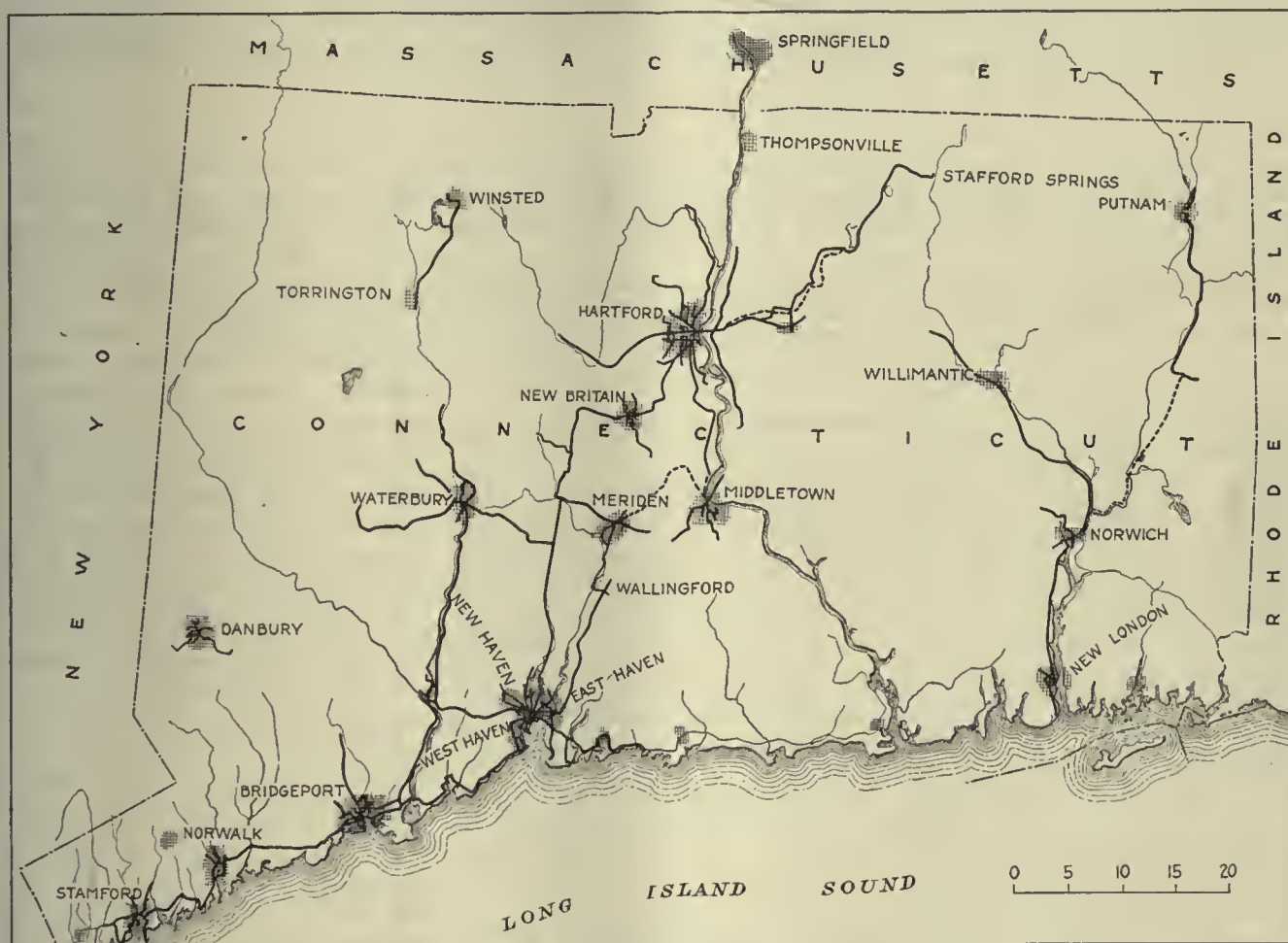
502. *Right of Way*.—For sections adjacent to railroad right-of-way, New York, New Haven & Hartford

cross-sectioned by commission engineers accompanied by company engineers.

508. *Special Trackwork*.—Detailed plans of each installation were available and the costs were computed directly from these plans.

512, 516, 536-538. *Tools, Equipment, Furniture, Etc.*—These accounts comprise roadway machinery and tools; crossings, fences and signs; shop equipment; furniture; miscellaneous equipment. The company supplied the inventory and prices were assigned by commission engineers. These items combined amount to only 0.2 per cent of the physical total for the entire property.

515. *Bridges, Trestles and Culverts*.—Appraised es-



MAP SHOWING CONNECTICUT COMPANY SYSTEM, WHOSE VALUATION IS DESCRIBED IN THIS AND SUBSEQUENT ARTICLES

Railroad figures per acre as supplied to the Interstate Commerce Commission in its railroad valuation were used. Normal values based on the price paid by a willing buyer to a willing seller were multiplied by a factor, which varied from 1 to 5, to cover severance, damages and other costs of acquisition. Other parcels were valued in part by reference to company records and in part by field estimates of commission engineers or real estate men.

503. *Park and Resort Lands, Etc.*—The judgment of real estate dealers, tax collectors and valuation records of the New York, New Haven & Hartford Railroad were relied upon for this account (1 per cent of the total).

504. *Grading*.—In order to check the information appearing on the company's records and maps and to supply missing data a few of the interurban lines were

timates made by outside engineers for the company on the occasion of a regular maintenance survey were supplied by the company to the commission. A field check made by commission engineers at the time of the grading survey indicated a few corrections and additions.

522-526, 539-541. *Buildings and Various Other Structures*.—There are included here general office buildings; shops and carhouses; stations, miscellaneous buildings and structures; park and resort buildings; power and substation buildings; wharves and docks. The company had a record of each of these items covering size and character of construction. With a view to classification each of these structures was visited to ascertain its physical condition and the manner of use. The prices applied were on a cubic content and area basis similar to those employed by the I. C. C.

530-534. *Rolling Stock*.—Cars (passenger, combina-

tion, freight, mail, express, and service) with their electric equipment, and locomotives were examined to determine the type of body, of trucks and of electric equipment. Unit prices were then applied separately to each of these three components of each car. Cars manifestly in need of extensive repairs to permit shifting from part-time to full-time service were averaged at 80 per cent of reproduction value. No value was included for abandoned equipment.

542, 543. *Power and Substation Equipment.*—Lists of all the equipment were supplied by the company and these in conjunction with personal inspection enabled two consulting engineers, one electrical and one mechanical, both of wide experience in the field of steam-electric power, to report over-all values for the equipment in each plant. The commission felt that the candid opinion of these engineers on the lump reproduction value of the plants would be as valuable and reliable as would be the summarized result of a more detailed study unit by unit. Due to relatively recent construction, it was found easily possible to ascertain the equipment costs for the substation in considerable detail. The variation in installed cost of substation equipment per kilovolt-ampere with the capacity of the substation is exhibited in the accompanying curves as an interesting result of this study.

546. *Law Expenditures.* One per cent of the total

component of that account and these were then allowed for the insurance item:

2.4 per cent of (517-521, 544).

0.3 per cent of (530-534).

0.7 per cent of (536-538, 542, 543).

550. *Promotion and Organization.*—Two per cent of accounts 501-549, 500a-550e was the allowance for this capitalized expenditure. General stores and supplies as inventoried by the company and priced jointly by the company and commission engineers amounted to some 2.5 per cent of the physical total.

Analysis will show that the total of the tangible overhead allowances amounts to 22.2 per cent of the total of physical items appearing in accounts 502-544. If general stores and supplies and working capital are deducted the remaining overhead items represent about 18.2 per cent of the physical total.

HISTORICAL COST

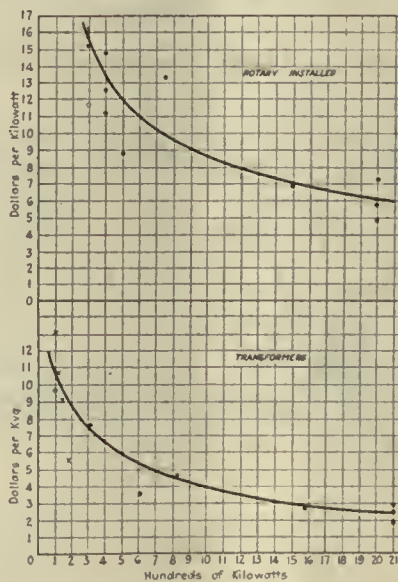
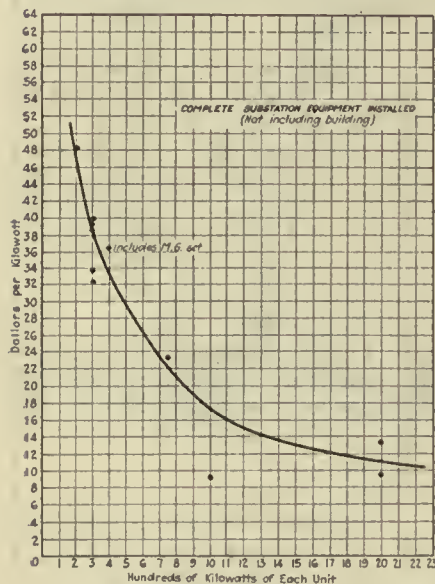
The statistician and auditor made a very careful study of the corporate and accounting history of the company and arrived at the totals in the table below.

A corresponding total of \$19,741,537.14 was found to be the historical cost of the lines leased by the company, making the total historical cost of the company's owned and leased lines \$60,753,352.85.

Much of the difference of \$9,000,000 between the reproduction cost and historical cost is accounted for when it is recollected that many of the component lines started as horse railways, and the capital invested in horses, rolling stock, light rails and roadbed construction, none of which is in existence today, is included in those costs, as well as the cost of the modern tracks, pavement and equipment, built and paid for with new and additional capital.

The foregoing shows in a general way the sources of and the bases for the values assigned to that portion of a street railway property which, for contrast, may be called "inside plant." While no claim is made that all the figures are rigidly exact, it is felt that they surely are entitled to be classed as proximate in their character rather than merely approximate. Or from another angle, such errors, omissions or duplications as may have crept in

in this instance, as is nearly always the case, were well within the limits imposed at the start and, in the opinion of the writer based on the arguments advanced, are



CURVES SHOWING SUBSTATION COSTS AS RELATED TO CAPACITY

amount of accounts 504-526-539, 541 and 544 was allowed for this item. It will be noticed that this includes all physical items except land, rolling stock, furniture and equipment of power plants and substations.

547, 549. *Interest and Taxes.*—In carrying out the instructions of the commission to ascertain the reproduction cost based on prices prevailing during the period 1910-1915, the engineers estimated that the system would be established in five approximately equal sections, each requiring one year to construct. On this basis an allowance was made for interest and taxes of 6 per cent for one year on accounts 501-546, 548, 550a-550e.

548. *Insurance (Injuries and Damages).*—Employers' and public liability insurance premiums (based on payroll) amount to the following percentages of the total of each account when applied to the probable labor

FINAL TABLE SHOWING HISTORICAL COST OF THE PROPERTY OF THE CONNECTICUT COMPANY

Expenditures for road and equipment on owned lines (8/1/1906 to 12/31/1919).....	\$16,032,996.00
Expenditures for road and equipment on leased lines (1906-1919).....	5,159,503.61
Total expenditures on owned lines and leased lines.....	\$21,192,499.61
Cost of construction and equipment of the several street railway lines purchased by predecessors of the present company, as shown by the last report of such street railway companies to the Railroad Commissioners.....	19,819,316.10
Total historical cost of street railway properties of the Connecticut Company, at Dec. 31, 1919.....	\$41,011,815.71

tolerable in all ordinary utility valuations. A later article will exhibit in considerable detail the method of attack for the "outside plant."



TWO FEATURES IN TWIN CITY'S DEMONSTRATION

Railways Find Real Publicity Pays

**Demonstrations on National Electric Railway Day Catch Public Eye for Unusual Sights
—Editorial Nose for News that's Different—Makes Folks in the Industry Realize
the Importance of Their Jobs—Interest of Public Further Aroused by
Competition for Prizes for Essays and Free Passes**

THE electric railway industry on May 4—National Electric Railway Day—proved itself the “Babe Ruth” of the public utility league. It knocked the advertising and publicity ball far out over the clubhouse. May 4 was proclaimed National Electric Railway Day by the committee on publicity of the American Electric Railway Association and notices to this effect were sent out to the membership on April 16 over the signature of P. H. Gadsden, president.

The celebration was without doubt a success. In virtually every city in the United States where an electric car is run the increased efficiency of local transportation service and the great importance of local electric railway systems were driven home to the public. This was accomplished by parades showing the contrast between either the horse cars of a third of a century ago or the earlier types of trolley cars and present up-to-date \$15,000 cars, newspaper stories, display advertising and other publicity.

Reports received by the Advertising Section of the association, which suggested details of the program to companies under the direction of the publicity committee, indicate that more than a score of companies staged some form of demonstration in different parts of the country.

Practically every daily newspaper in the country carried either a local or a telegraph story about national observance of the day. These stories not only told the history of the electric railways but also discussed the

It was well to give a public demonstration of the anniversary of the trolley, for it brought vividly to public mind the great advance that has been made in transportation. People are prone to live intensely in the present and to forget or to ignore progress that has been achieved.

—*Washington (D.C.) Star*

present problems of the industry. Two press associations put out national stories to 2,000 daily newspapers which were prepared on facts furnished them by the Advertising Section. Local companies co-operating with their home papers supplied further information that led to a large number of feature stories of community importance. Clippings so far received by the association show that the stories ranged from 300 words to a page and a half. Most of them were liberally illustrated with pictures of former and present types of cars. Many newspapers also commented editorially on the ob-

servance of the day and the growth and importance of electric railways to the welfare and development of urban centers.

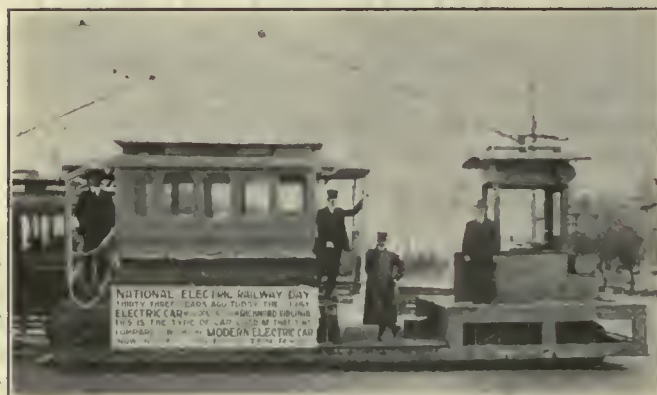
The largest news motion picture organizations of the country took motion pictures of several of the celebrations. Advices from A. H. Herrmann, Virginia Railway & Power Company, say that several motion picture operators were present at the Richmond celebration and took pictures of the parade despite the inclement weather. These pictures were shown later in motion picture houses throughout the country.

Many local companies supplemented the newspaper stories with display advertisements. The Northern Ohio Traction & Light Company and the Virginia Railway & Power Company issued special editions of their own publications, the latter being distributed broadcast to car riders. The Advertising Section also provided special cards for window display and other leaflets.

Three companies, namely, those operating in East St. Louis, Ill.; Charleston, S. C., and Pottsville, Pa., offered money prizes for the best essay or historical review of the development of the local system. In Pottsville the prize offer was limited to the school children and the interest taken is reflected in the illustration shown.

Among the companies that have reported street demonstrations are: Union Street Railway, New Bedford, Mass.; Virginia Railway & Power Company, Richmond, Va.; Twin City Rapid Transit Company, Minneapolis and St. Paul, Minn.; Indianapolis (Ind.) Street Railway, Eastern Pennsylvania Railways, Pottsville, Pa.; Rockford (Ill.) & Interurban Railway and the San Francisco-Oakland (Cal.) Terminal Railways. Several companies, including New Orleans and St. Louis, have reported that they intend to stage demonstrations later.

Some difficulty was found in several places in resurrecting old rolling stock that would show the desired contrast between present and former day service and therefore such companies could not put on a parade,



ONE OF THE FEATURES SHOWN IN OAKLAND, CAL.

but contented themselves with display advertising and newspaper publicity.

A letter from Mr. Herrmann regarding the Richmond celebration said in part:

"Despite the cold, rainy day we paraded three cars throughout the city in the afternoon, the front one being the oldest type summer car we could find; in fact, it was the only car of the kind we could secure, and it was quite antique looking, being the first summer car operated on the Richmond lines. The car was signed on the sides as you will note in the illustration and it carried a brass band. The next car was one of the big center-entrance type and then followed a modern safety car, these two carrying the Mayor, City Councilmen and officials of the company. The parade started from Twenty-ninth and P Streets, which was the terminal from which the first electric railway operated.

"Film representatives from Washington came down, arriving just a few minutes before the parade, and they got pictures from several sections of the city.

"Everything worked out very well and I do not believe we could have made a better demonstration if we had had a month's time. In fact, I believe the speed under which every one worked had a stimulating effect."

The celebration in Minneapolis and St. Paul attracted widespread attention, the newspapers giving it publicity prior to and on Electric Railway Day. In Minneapolis Henry Green, a former driver but now in the

legal department, again took hold of the reins of the car. After a trip through the down-town section of the city the car was taken to St. Paul, and there John Prior, the oldest street car conductor, was the driver. The car was preceded by the trainmen's band in both cities. The fourteen persons making application to ride in the car were given seats of honor.

CONTEST BETWEEN OLD-TIMERS AROUSED KEEN INTEREST IN NEW BEDFORD, MASS.

New Bedford, Mass., had a tremendously successful celebration. Immediately after the celebration of the day was suggested, the Union Street Railway began preparations for the event and succeeded in arousing great interest. One of the most successful features of the program was the offer of a year's free transportation over the local lines to the oldest man who rode on the horse car during the parade. A heated contest between old residents ensued and the prize finally was won by Edwin B. Macy, 88 years old. The reins were handled by James Card, one of the oldest former employees of the company. Peter Duprey, another old driver, also was on the platform. A clipping from the *New Bedford Times* says that between ten and fifteen thousand persons witnessed the demonstration. Not only the New Bedford but also some of the Boston papers devoted liberal space to a review of the celebration.

The Pottsville, Pa., celebration also attracted much newspaper publicity. The *Pottsville Republican*, which in the early days led the fight for electric railways in that territory, devoted more than a page to the story. C. A. Hall, general manager Eastern Pennsylvania Railways, and his assistants worked energetically in bringing about a successful observance of the day and they were well repaid for their efforts. Unfortunately, it was impossible on account of rain to keep the old time car out as long as seemed desirable on May 4, so it was brought out again later in the week.

In Indianapolis Robert I. Todd, president Indianapolis Street Railway, quietly slipped one over on the folks by springing his show on the unsuspecting public at about 5 o'clock in the evening. An old-time horse car drawn by two mules followed by a modern electric car started from the Traction Terminal Station and ran through the principal streets of the town. In describing the trip Mary E. Bostwick, a staff writer of the *Indianapolis Star*, says that "all the traffic rules in the world were broken by the mules and that a cop almost arrested the party." Besides Mr. Todd, Joseph A. McGowan, secretary and treasurer of the company; James P. Tretton, superintendent; James F. Lynch, J. E. Sweeney and Edward Noon rode on the car.

In Rockford, Ill., Gus King, who drove a mule car in the olden days, was in charge of the resurrected hay-burner. For a brief half hour the mule enjoyed prominence, being the cynosure of all eyes on the principal streets. But, as is often the fate of heroes, he suffered a fall and in one short half hour after the demonstration he again was dragging a prosaic coal wagon through the back streets of the town.

The East St. Louis & Suburban Railway co-operated very successfully in the observance of the day. Exhibits received show that single and double-page advertisements calling attention to the day and its significance were carried in various local papers prior to and on the day of the celebration. Dashboard signs were also displayed on the cars May 3 and 4. Sleeve

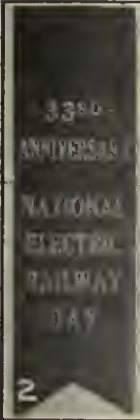
bands, as illustrated, were worn by officials, office employees and car crews on May 4. The advertisements were particularly well executed. One of them contained articles by prominent citizens regarding the growth of the local traction system. One striking feature of this same advertisement was the announcement of the "Funeral of the Dinkies" displayed within inverted rules, as well as interesting illustrations of old time and modern cars.

In Oakland, Cal., a single-truck car of early vintage was mounted on a flat car. The flat then toured the

Ark.; Los Angeles, Cal.; Lynchburg, Va.; New Orleans, La.; Oil City, Pa.; Pine Bluff, Ark.; Peoria, Ill.; Savannah, Ga.; Seattle, Wash.; St. Joseph, Mo., and Sheridan, Wyo. In these places either well-illustrated special advertisements or signed staff stories or both were features.

The personnel of the publicity committee, under whose direction National Electric Railway Day was celebrated, is:

Barron G. Collier, New York, chairman; S. W. Huff, New York; B. I. Budd, Chicago; C. B. Buchanan, Rich-



AMERICAN ELECTRIC RAILWAY DAY



ALL SECTIONS OF THE COUNTRY PARTICIPATED IN THE CELEBRATION OF NATIONAL ELECTRIC RAILWAY DAY

1—President Todd of Indianapolis at the reins.
2—Badge worn by the employees of the Little Rock Railway & Light Company.
3—First and last types of cars at Pottsville, Pa.

4—Arm band worn by train crews, officials and office employees of the East St. Louis & Suburban Railway.
5—School children of Pottsville participating in demonstration.
6—Earliest type of cross-bench open car operated in Richmond.

city and caused much comment on past means of transportation.

Advices have been received from companies showing that much attention was paid to the day by the newspapers and the public in more than 125 other cities. Among those more than a score need special mention, namely, Bangor, Me.; Charlotte, N. C.; Cincinnati, Ohio; Duluth, Minn.; Elmira, N. Y.; El Paso, Tex.; Evansville, Ind.; Framingham, Mass.; Green Bay, Wis.; Haverhill, Mass.; Jackson, Mich.; Little Rock,

mond, Va.; W. A. Draper, Cincinnati; C. D. Emmons, Baltimore; L. S. Storrs, New Haven, and Horace Lowry, Minneapolis. The details of the program were carried out by Labert St. Clair, head of the association's advertising section.

The committee has great reason to be pleased with the results of the day. It demonstrated the possibilities of nationally advertising electric railways through the co-operation of local companies with the association's Advertising Section.

Large Meeting in Hartford

Joint Session of New England Street Railway Club and Connecticut Company Section No. 7, A. E. R. A., Proves Most Successful

PERFECT weather for the inspection and sightseeing trips added the finishing touch to the success of the joint meeting of the New England Street Railway Club and Connecticut Company Section No. 7, American Electric Railway Association, at Hartford on Wednesday, May 18. More than 250 members of the two organizations spent the day at Hartford and attended the sessions which started at noon and stopped at 10 o'clock at night. While suggestions for holding such a joint session have been made many times in the past, it was not realized until this week.

The meeting started with a luncheon at the Wethersfield carhouse of the Hartford Division of the Connecticut Company, which was followed by the showing of the moving picture reel taken at the New England Street Railway Club outing in Montreal last summer. After this E. Irvine Rudd, chief engineer of the Public Utilities Commission of Connecticut, presented a paper on "Appraisals and Their Uses." After discussing the various purposes of appraisals and showing the progress of engineering valuation, Mr. Rudd discussed the recent valuation which the commission has made of the railways in Connecticut. In this discussion he presented an analysis covering much the same ground that is included in the articles by his associate, A. E. Knowlton, the commission's electrical engineer, in this and subsequent issues of the *ELECTRIC RAILWAY JOURNAL*.

The rest of the afternoon was spent in visits to the Connecticut Company's shops and carhouses in Hartford, in inspecting the power plant of the Hartford Electric Light & Power Company, now in construction, and in sightseeing trips around Hartford by special car and by auto.

At 6:30 dinner was served to the entire attendance at the Hartford Club. Following this dinner a succession of chairmen took charge of the meeting, in the following order: V. S. Curtis, vice-president of Connecticut Company Section No. 7; N. J. Scott, newly appointed manager of the Hartford Division of the Connecticut Company; Edward Dana, president of the New England Street Railway Club, and W. J. Flickinger, vice-president for Connecticut of the New England Street Railway Club. During these successive chairmanships, resolutions were adopted on the death of Warren P. Bristol, late manager of the Hartford Division, and 66 new members were admitted to the New England Street Railway Club.

With Mr. Flickinger presiding, the program of the evening was then commenced. The principal speaker was Richard T. Higgins, chairman of the Public Utilities Commission of Connecticut, the keynote of whose address was to urge co-operation of the rank and file of street railway employees to their executives and to the company in providing good service to the public. Mr. Higgins said that originally it was electric railways themselves which sought franchises and thereby established themselves so that it was therefore up to the companies primarily to furnish service and overcome the obstacles of street railway operation. Their efforts, however, must be coupled with the co-operation of the public, but no amount of sympathy or co-operation by the public will overcome any lack of co-operation on the part of the company. Railway men, particularly exec-

utives, are public servants, but no amount of ability of executive officers is any good without the co-operation of the men. Any one voluntarily entering public utility service takes on the obligations of a public servant.

Mr. Higgins also pointed out that the Public Utilities Commissions are necessarily influenced, whether rightly or wrongly, by public opinion, and it is therefore of vital importance that it be by an enlightened public opinion. From this it is necessarily concluded that the company should make every effort to enlighten the public, for naturally the public wants to be fair, and if it has full information its opinions and therefore its influence on the commissions will be sound.

Mr. Higgins further emphasized the fact that what the public wanted is service much more than a reduction in fares. The public wants good service, for which it, in his belief, is willing to pay. Mr. Higgins also talked on the practical business-like valuation which Mr. Rudd had discussed in the afternoon, and also on the new problems of the Public Utilities Commission in Connecticut due to the placing of jitneys under its control in that state. He said that the Connecticut law now made it obligatory to determine if public convenience and necessity require jitney service, and, while this brought up many problems which he could not discuss and decide now, he did want to point out that the question of public convenience and necessity is very largely the result or function of the feelings of the public, based, however, on fact.

Following an entertaining Roscoe Arbuckle movie, Mr. Storrs, president of the Connecticut Company, gave the final address of the evening, in which he emphasized the almost revolutionary changes which have taken place in electric railway operation in the last four years. He gave some interesting figures for Connecticut, and pointed out that in 1900 the gross revenue of Connecticut railways was \$3,271,000, the operating expenses \$2,016,000, while in 1919, with a gross revenue of \$12,875,000, the operating expenses were \$11,200,000. This left a net in 1900 of \$1,080,000 and in 1919 less than \$1,000,000, while in 1916, an intermediate year, the net was \$3,066,000. Thus, with the investment in Connecticut almost trebled, the net revenue has actually decreased, and while 1920 figures are not available in detail, he predicts a deficit for the state of about \$1,000,000.

However, he pointed out that the railways have gone through four years of stress and strain to the advantage of all. New methods of doing everything have been evolved, and these years have also helped to encourage co-operation and to promote better ideas of railway publicity and information.

Lay Single Tracks Off Center

IN CONNECTION with some repaving being done by the city, the Chattanooga Railway & Light Company recently reconstructed some of the single-track lines in the city, and in doing so placed the single track where one of the two tracks would be in case it were a double-track section of line. This was done because it was felt that development in the near future might make it advisable to double track these sections of the system and that considerable expense would be saved if the one track which had to be laid now were placed so that it would form one of the double tracks in the future without the necessity of doing anything to it at the time the system or section was double-tracked.

Fares and Short-Haul Traffic

THROUGH an error in the printing office last week the concluding lines of an article appearing in that issue on "Fares and Short-Haul Traffic," by Edward A. Roberts, engineer with John A. Beeler, New York, was omitted. The greater part of this article appears on pages 896 and 897 of last week's issue. The concluding two paragraphs, including the omitted portions, are as follows:

"The placing of a definite value on the average car rider's time is not at all a simple task, and one person's estimate is about as good as another's. A person's earning ability should, however, not be confused with the amount of time the same person would feel justified in using in order to avoid spending 5 cents. The average figure of 50 cents an hour seems high, although it would apply to those who are actually being paid for their time by an employer or to those who are hurrying to specific engagements. Under this classification are such people as salesmen, bill collectors, business men and plumbers. The figure of 25 cents an hour fits more closely the estimate that the average person uses in deciding whether to ride or walk. The average woman who keeps house and shops during the middle of the day bases the worth of a street car ride on some such amount as this. The same applies to the vast majority of people going to and from work. It is doubtful if the leisure time of even the well-paid classes should be considered at more than 25 cents an hour.

"The method of analysis outlined in this article is not intended to point out a definite answer to the fare question or to say what fare will yield the most total revenue in a specific case, but it is believed that its use will in many instances shed additional light on some phases of one of the industry's most serious problems."

Discussion of the National Electrical Safety Code

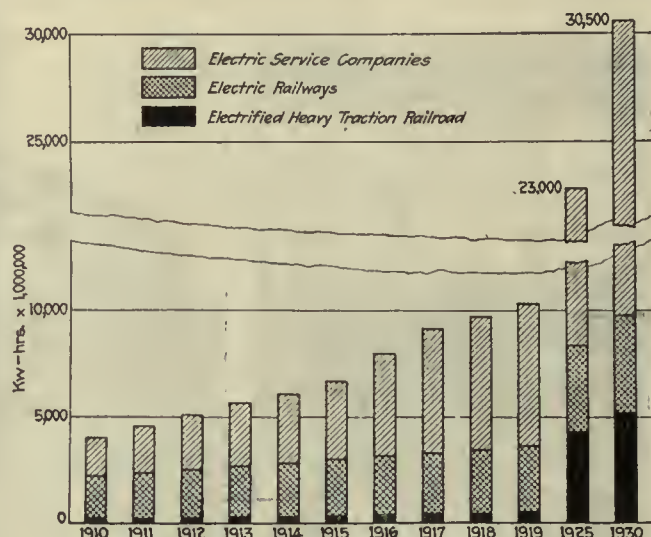
THE Bureau of Standards has just issued Handbook No. 4 on the National Electrical Safety Code, containing a revised discussion of the rules and forming a companion volume to Handbook No. 3, which contains the revised edition of the rules themselves. The discussion of the rules has been considerably amplified. Many items and suggestions have been included which are not involved in the rules themselves but have bearing upon good practice and matters immediately related to the subject of the rules. In addition, the endeavor has been made to make the meaning and interpretation of the rules entirely evident and to give in many cases the reasons which have prompted inclusion of particular rules in the Electrical Safety Code. Illustrations have been provided to show the intent and application of a number of rules.

The discussion of the rules follows the order of the rules themselves and is segregated into the four parts dealing respectively with stations and substations, overhead and underground lines, utilization apparatus, and operation of utility stations and lines. There is also a supplementary section dealing with the subject of grounding. The introduction to the discussion includes the results of a survey of pole lines made jointly with the committee on safety rules of the National Electric Light Association and conducted in the summer of 1919.

Meeting of the Superpower Committee

AT A MEETING in New York on May 13 of the Advisory Board of the Superpower Survey a number of interesting facts were brought out. It is expected that the final report will be finished on June 30.

In making the survey 315 utilities were examined, representing a capacity of 4,000,260 kw., of which 11 per cent was hydraulic and 89 per cent steam. The output of these stations was 10,301,000,000 kw.-hr., hydraulic stations, producing 16 per cent of this output and steam stations 84 per cent. The steam stations consumed 11,806,000 tons of coal at a cost of \$63,228,000. The average coal rate was 2.73 lb. per kilowatt-hour. Although the maximum capacity of any steam plant in the territory was 163,000 kw. and that of any hydraulic plant was 83,500 kw., the average of all steam plants was found to be 10,000 kw., while the average of hydraulic plants was 2,700. An investment of \$598,000,000 is represented by these plants, 85 per cent of the total being for steam plants and 15 for the hydraulic. Probably 25 per cent of the power requirements



PAST AND ESTIMATED FUTURE GROWTH OF ENERGY CONSUMPTION IN THE SUPERPOWER ZONE

can be supplied by hydro-electric development. Standardization of 60 cycles as a uniform frequency was recommended.

W. S. Barstow presented an outline of a financial plan for the system. Under this plan a superpower company would be formed, having only one class of securities, i.e., non-par value stock, and all existing public service companies in the territory, as they became customers of the superpower company, would be entitled to subscribe to this non-par stock of the company pro rata, based on demand and load factor or on some other predetermined definite basis. In case any public service company does not become a stockholder in the superpower company the stock to which it is entitled to subscribe can be offered for sale to the investing public.

After the presentation of this plan there was a discussion on the relative merits of a federal or state charter for the proposed company, but no definite decision as to a recommendation was reached. The accompanying chart shows the past and estimated future growth of energy consumption in the proposed superpower zone.

Equipment and Its Maintenance

Short Descriptions of Tools Used Together with Mechanical and Electrical Practices of All Departments to Supplement the Preceding Longer Articles

Connecticut Company Remodels Cars for One-Man Operation

Platforms Were Reconstructed, Air Brakes Installed and All the Usual Safety Devices Were Added to Make the Car Suitable for One-Man Operation

THE Connecticut Company has remodeled forty-three single-truck closed cars and added additional equipment necessary to use them for one-man operation. The actual work of remodeling was done in several of the company's shops, and where new parts were constructed or others changed this was done in the reclamation shop at New Haven. In reconstructing these cars the center

accompanying illustrations, was designed by the engineers of the company, and the work of making the changes necessary in the handle was done in the reclamation shop in New Haven. By pressing down the button in the handle a lever engages a cam installed under the handle around the shaft in a location to replace the controller water cap. With the button depressed the cam is thus turned against the pressure of a coil spring inside the cam. The movement of this cam operates another small lever at the back of the controller, which in turn operates a push-button switch to close the circuit for the auxiliary line switch. Whenever the button in the handle is released the cam



PLATFORM EQUIPMENT GROUPED TO PROVIDE MAXIMUM SPACE



ONE OF THE REMODELED CARS IN SERVICE IN STAMFORD, CONN.



CENTER ROW LIGHTING ARRANGEMENT WITH SHADES

portions of the bulkheads were removed at each end, but the upper and lower end panels were retained. Two short stanchions were installed between the upper and lower end panels on each side to give the necessary support.

The location of the platform equipment was changed and additional equipment was added in a location so as to provide as much space as possible for the entrance and exit of passengers. The K-10 controllers were moved to the extreme left and mounted on a raised platform used by the motorman. Between the controller and the door additional apparatus was installed consisting of the motorman's air brake valve, an upright stanchion with handle for operating the doors, the hand-sanding lever and an additional upright stanchion for holding the Johnson fare box. The hand brake staff was retained in its original location, but a drop handle was installed to afford more platform space.

While the original K-10 controllers have been retained, additional equipment has been added as required to provide the safety features for one-man operation. A type of dead man's handle, as shown in one of the

returns to its "off" position by the action of the spring and the operating circuit is opened by the line switch. The line switches used consist of the General Electric Company's SB-61-11 Auxiliary Form A contactors. Three Westinghouse H-350 push button switches were added at each end of the car. One of these push-button switches is located so that the opening of the door cuts off power and provides so that power cannot again be restored until the doors close. One of these, as just described, operates in conjunction with the handle on the controller to provide the dead man's device so that power will be shut off as soon as the operator releases the handle. The third switch is used as a foot switch so that operation can be continued without the necessity of holding down the dead man portion of the handle. These cars were originally equipped with two hood switches. One of these was removed and one is still retained as a switch for opening the circuit in case of emergency and as a switch ahead of the control equipment.

The remodeled cars were equipped with straight air brakes and the equipment used was taken from obsolete

cars and open cars which were not being used. Old governors, engineer's valves, main reservoirs, brake cylinders and compressors were thus used. The compressors were some which were taken from the Birney type of one-man cars which the company has in operation. These were the General Electric CP-25 and Westinghouse DH-10 type, which were found of too small capacity for the Birney cars, which are equipped with pneumatic door engines, and they were used on these reconstructed cars, as the amount of air required is less than that which is used on the standard Birney car.

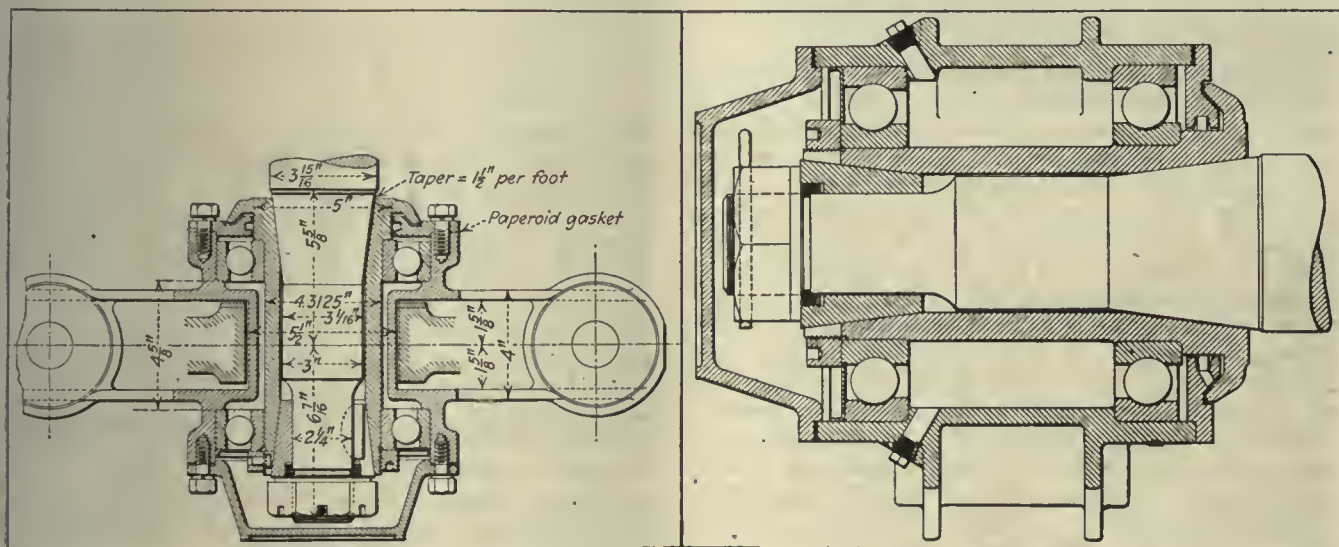
The brake cylinder is installed underneath one of the platforms and is connected to the brake rigging as originally installed for hand-brake operation. The same type of hand-operated sanders are used, but a new sanding lever was installed to make its operation more convenient for the motorman. These cars were provided with fixed steps, and two of these were retained without change. At the two entrances which were not used the doors were screwed shut and the steps were removed. At the entrances retained new

New Ball Bearing Journal Boxes

Journal Box Designed for Brill No. 79-E Truck and Interchangeable with Plain Sleeve Journal Box Developed Which Has Many Improvements Over Old Type

THE principal objection to the ball bearing journal boxes which have been tried out on electric cars during the past few years is the tedious and careful handling necessary in removing and assembling the boxes whenever it is necessary to replace wheels. After the journal boxes have been removed and replaced several times the bearings become loose on the axle and so cannot safely sustain the heavy shock loads imposed upon them for any length of time.

In an endeavor to overcome this objection the Gurney Ball Bearing Company has just brought out a new design, which is illustrated herewith. This type of journal box was designed primarily for the Brill No. 79-E truck and is interchangeable with the plain sleeve journal box now used, with the exception of the axle ends. As the ball bearings are of the angular contact type, mounted opposed to each other, they can be adjusted.



BALL BEARING JOURNAL BOX DESIGN FOR SAFETY CARS

folding doors were installed, arranged to open outward. The doors are hand-operated from a convenient location for the operator.

The lighting arrangement of the old cars consisted of two three-light clusters and one two-light cluster inside the car with additional lights on the platform and in the headlight to make a total of two five-light circuits. Some of the cars had poor headlining and it was decided to replace this, and at the same time a new lighting arrangement was provided, which consists of a row of five lamps down the center of the car, the additional lamps for the platform and headlight making a total of ten lights arranged in two circuits. The platform light is installed over the top of the door to provide illumination for the steps when the doors are open.

Originally these cars had two lights for each dash sign. One of these lights was used for the light over the door, the other being retained in its original position. The original trucks of the cars were retained, these consisting of Brill type 21-E, and the motors used are G.E. 67. These cars seat twenty-four and twenty-six passengers and are provided with longitudinal seats.

The engineers of the Gurney company have found adjustments quite necessary, as no matter how efficiently the dirt seals are designed or how much attention is given to the lubrication of the bearings some will become loose, and this play must be taken up by means of the threaded nut at the outer end of the sleeve, if a long life of the ball bearings is expected.

In the new design the sleeve on which the bearings are mounted protrudes through the journal box inner cover and the cup flanged end acts as a dirt slinger. The sleeve is held in place by the tapered spring adapter sleeve and threaded nuts on the axle end, and as it is supported by the axle on the taper bored ends, the bearing loads are thus transmitted. A Woodruff key inserted into the slot of the adapter prevents any torsional pressure being transmitted onto the axle end nut. This relieves the cotter pin which holds the nut in place from any strain. Should the tapered spring adapter sleeve be clamped solidly between the bearing sleeve and the axle, for removing the journal box from the axle, a tapped hole for the insertion of a special tool to remove this sleeve is provided.

The whole journal box is handled as one complete

unit and can very easily be assembled or removed from the axle to replace wheels or gears. The ball bearings are also not exposed and practically no foreign matter can get into the journal box even if the outside cover is taken off to remove the locking device which fastens the ball bearings to the axle.

Expanding Railway Motor Bearings

To Provide a Tight Fit of Bearings in Their Housings, the Practice of the Third Avenue Railway Is to Expand Worn Bearings Slightly by Means of an Air-Operated Mechanism

BY H. J. KROMBACH

General Foreman Third Avenue Railway, New York City

THE problem of taking up the wear that occurs between the outside of bearings and their housings in railway motors has bothered many master mechanics. Probably the method most universally employed is to insert shims between the bearing liner and the housing so as to provide a tight fit. If this wear is not taken up in some manner after it has once started it increases very rapidly and ultimately leads to the scrapping of the bearing and either the reboring or rebushing of the housing.

In order to meet these conditions the Third Avenue Railway has been expanding both armature and axle bearing liners by making use of an air-operated press constructed in its own shops. The accompanying illustration shows this mechanism, which consists essentially of a 16-in. brake cylinder to which is attached a lever or rocker arm, the opposite end of this arm being arranged to transmit the pressure to a mandrel which is forced through the bearings to expand them. The 16-in. brake cylinder is mounted directly on one of the columns in the shop and the piston rod of this brake cylinder is connected directly to the rocker arm by a pin which works in a slot in the arm. The piston is stopped just before it reaches its extreme position by a mechanical stop which is installed above the cylinder on the same supporting post. The rocker arm is of heavy construction, being made of two 6-in. channels. The distance from the piston-rod connection to the fulcrum is 38 in. and from the fulcrum to the point where pressure is applied to the mandrel is 19 in., so



AIR PRESS FOR EXPANDING BEARINGS

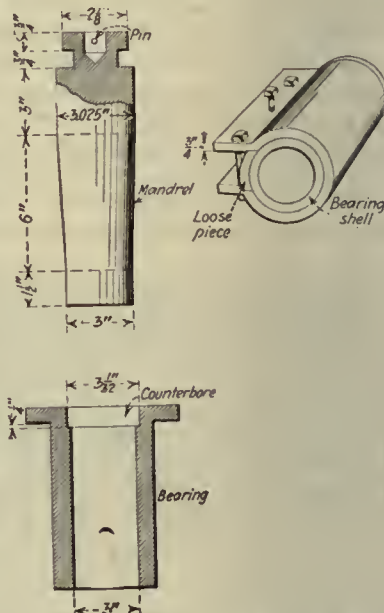
that a ratio of 2 to 1 is obtained. An air pressure of from 80 to 90 lb. is used for operating the mechanism. With an air pressure of 85 lb., 17,090 lb. is obtained on the brake-cylinder push rod and twice this amount, or 34,180 lb., is applied to the mandrel for expanding the bearings. The air for operating the cylinder push rod

is controlled by an ordinary straight-air brake valve, such as is used on electric cars.

A substantial table has been constructed to support the bearings while they are being expanded. This is supported immediately underneath the outside end of the lever by two large wooden blocks. The table itself is made of an iron plate and is 1½ in. x 18 in. x 4 ft. 8 in. in dimensions.

HOW THE BEARINGS ARE EXPANDED

In order to expand an armature bearing, it must first be made smooth and clean inside. To prevent the cracking of the end flange during expansion it has been found necessary to bore out the flanged end to a diameter approximately ⅜ in. larger than that of the remainder of the inside of the bearing. The depth of this portion of larger diameter should be approximately ¼ in. greater than the depth of the flange. This enlarging of the bearing under the flange removes the strain at that point. An accompanying sketch shows a bearing which has been finished to an inside diameter of 3 in. and gives the corresponding dimensions for the parts underneath the flange, together



AT LEFT, ARMATURE BEARING AND MANDREL USED FOR ITS EXPANSION. AT RIGHT, SLEEVE FOR HOLDING ARMATURE BEARINGS

with the dimensions of the mandrel which is used for expanding such a bearing. The mandrel is tapered from a bottom diameter of 3 in. to a top diameter of 3.025 in., the bottom end being made straight for 1½ in. and the top for a distance of 3 in. To facilitate the handling of the mandrels a flanged top is turned on them, which is bored out inside and a pin is then inserted through this portion so that the mandrel can be readily lifted and handled with a hook.

To provide for uniform expansion and to support the bearing a sleeve is placed around it while it is being expanded. This is made of ¾-in. steel and is open on one side. When the bearing has been inserted a loose piece is placed in this open space and the entire sleeve is then clamped around the bearing by means of two bolts, as shown in the accompanying illustration.

The operation of expanding an armature bearing consists first of heating the bearing to a temperature of about 75 deg. F. The window of the bearing is then placed against the closed side of the sleeve and the open side of the sleeve is closed with the loose filler as already explained. The sleeve is then tightened into place with the two bolts and the bearing is then placed on the bench with the flanged end uppermost and the mandrel, which has previously been coated with a little white lead, is placed in the upper portion of the bearing. Pressure is then applied and the mandrel is forced entirely through the bearing. The plate on which the

bearing rests is provided with a hole of sufficient diameter so that the mandrel will go through this and drop down approximately $\frac{1}{4}$ in. below the surface of the table. In pushing the mandrel through the bearing air should be applied slowly and uniformly. After the mandrel has been pushed through, the bearing can be removed by loosening the two clamping bolts and screwing in a third bolt which is located in the center of the sleeve. This expands the sleeve sufficiently so that the bearing can be readily taken out. The mandrel is lifted through the hole in the table by means of a hook, to which is attached a cable and handle. The bearing is then allowed to cool and then it is again pressed with the same mandrel as previously used.

These operations will expand an ordinary armature bearing about $\frac{1}{16}$ in. and the outside of the bearing can then be turned down so as to give a tight fit in its housing, and the inside can be babbitted and turned to the necessary size to fit the armature shaft.

SHAPING AXLE BEARINGS

As axle bearings of the usual type are made in two parts, these are pressed into shape and expanded by use of a type of mechanism shown at the left hand end of the halftone illustration. A large steel block is bored out approximately 0.01 in. smaller than the diameter to which it is desired to have the outside of the axle bearing. The round bar which causes the spreading apart of the bearing is made approximately 0.01 in. larger than the inside diameter of the finished bearing. These bearings are expanded by placing them in a horizontal position and by use of the mechanism already described.

This mechanism is also used for forcing bushings in worn housings. Where the housings are worn to such an extent that rebushing is necessary, a cast steel bushing approximately $\frac{1}{16}$ in. thick is forced into the housings and these are then bored out to exact diameter. The ends of these bushings have a flange and are pinned in place after they are installed. During the past year more than 800 armature bearings have been reclaimed by this method, most of which would have been scrapped had not some such apparatus been available.

New Locomotive for Youngstown & Suburban Railway

THE Youngstown & Suburban Railway has recently placed in service a standard Class B, 45-ton Baldwin-Westinghouse locomotive, which was made necessary due to the increase in carload freight business. A large part of this business is made up of building materials handled by steam road equipment to a new tipple of a construction company. When completed, the total

storage of sand and gravel and other building materials and will be arranged so that a $4\frac{1}{2}$ -ton truck can be loaded in 2 minutes. Directly opposite the tipple there is to be constructed 1,100 ft. of track with a clear space of 900 ft., which will be used for handling brick, tile, sewer pipe and similar material. At the right will be constructed garages and barns for thirty-five motor trucks and wagons and fifteen horses, and on the left will be warehouses, office buildings, etc.

The new locomotive just purchased is equipped with



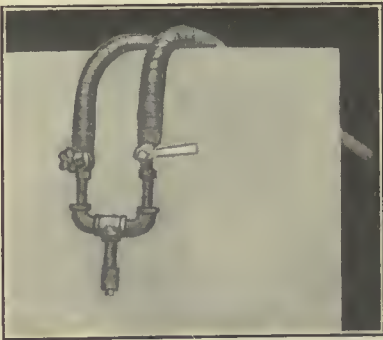
FORTY-FIVE-TON LOCOMOTIVE OF YOUNGSTOWN & SUBURBAN RAILWAY

four type 562-D-5, 600-volt, 100-hp. field control motors and HLF control. The maximum grade for this property is 2.05 per cent and the locomotive will handle five loaded 100,000-lb. capacity cars, or a train of fifteen empties, up this grade.

The general characteristics of this locomotive are as shown in the accompanying table.

Cars Washed with Air and Water Flusher

A GREAT saving in cost of washing cars is now being realized by the Chattanooga Railway & Light Company by the use of its combination air and water nozzle, an illustration of which is shown herewith. This is one of the many convenient devices which have followed the installation of the new air compressor in the Chattanooga shops. It is a National compressor



AIR AND WATER NOZZLE

type 3VS-23, of 300-cu.ft. capacity and driven by a single-phase, 54-hp. motor. The flushing device consists simply of two $\frac{1}{2}$ -in. rubber hose lines, one for air and one for water, each leading through suitable controlling valves to a common nozzle. The whole device is a combination of ordinary pipe

fittings. From the two valves there are bushings to $\frac{1}{2}$ -in. ells, which in turn lead to a tee, to which is connected another short bushing which is plugged at the end, a $\frac{1}{2}$ -in. hole being bored through the plug. Any combination of air and water can be discharged from this nozzle.

NEW LOCOMOTIVE FOR YOUNGSTOWN & SUBURBAN RAILWAY

Weight	45 tons
Maximum tractive effort (25 per cent adhesion) ..	22,500 lb.
Normal tractive effort at 9.7 m.p.h., full field, one hour	15,200 lb.
Continuous tractive effort with forced ventilation, short field	9,000 lb.
Maximum trailing load starting on 1 per cent grade.	789 tons
Balancing speed, short field at 600 volts, on level with 500-ton load	17.5 m.p.h.
Balancing speed, short field at 600 volts on 2.05 per cent grade with 350-ton load	10.2 m.p.h.

trackage from the railway company's switch to the end of the tipple will be more than 1,000 ft. and the total length of the tipple itself will be 550 ft., with bins having a capacity of approximately 3,000 tons of material. The various bins under this tipple are for the

The present method of cleaning out cars consists of first using the air line to blow out dust, after which a powerful stream of water is provided for flushing out the car, air and water being used here in combination. The results obtained by the use of this combination air and water stream are much better than from old hand-scrubbing or flushing out with water stream only, both from the cleanliness resulting and from the saving in time.

Under the former method of cleaning eight cars constituted a good day's work, whereas it is now possible to wash as many as twelve cars thoroughly with the same labor "besides two or three flivvers," as E. D. Reed, general superintendent, facetiously puts it. The only difficulty encountered, which is a minor one, is the handling of the double-hose line to keep it from getting twisted.

New Rock Crusher an Economical Addition at Charlotte

THE Southern Public Utilities Company has installed in Charlotte, N. C., a rock crusher which is proving to be a most economical addition. This company uses on the average about 200 yd. of crushed rock per month the year around. This had formerly been obtained at a cost of about \$6.25 per ton delivered. With the native supply of rock, however, it seemed to the company that it should be possible to obtain this at less expense.

Accordingly, last December the company installed an Allis-Chalmers rock crusher with a capacity of 60 yd. per day and records since then indicate that the over-all cost of the crushed rock is now \$2.50 as compared with the previous \$6.25. Farmers and others haul rock into Charlotte and deliver it for \$1.50 per ton, the other dollar representing the cost of crushing. In addition to crushing new rock, the crusher is also used to break up old cement and brickbats which are excavated by various contractors in connection with work in and around Charlotte.

Accompanying illustrations show the rock crusher and indicate how it is conveniently located by a siding of the company's electric railway in Charlotte. The crusher installation includes a belt conveyor which carries the rock with a minimum expense of handling. The crusher is adjustable to produce crushed rock from about $\frac{3}{4}$ in. to 3 or 4 in. in size. The company is well satisfied with this move it has made to produce its crushed rock more economically.



TWO VIEWS OF ROCK CRUSHER INSTALLED AT CHARLOTTE, N. C.

New Machines for Removing Pavement

A NEW compressed-air-operated machine for removing pavement and general demolition work has just been placed on the market by the Ingersoll-Rand Company, New York. Two types of paving breakers, termed BC-25 and CC-25, are now available. The BC-25 type is intended for use with an air pressure of over



REMOVING PAVEMENT ALONG RAILWAY TRACK

80 lb., while the CC-25 is for use with an air pressure less than 80 lb. The BC-25 type weighs 58 lb. and is 24 in. over all, while the CC-25 weighs 68 lb. and is 25 in. long. Both have a 4-in. stroke. In construction the paving breaker is very similar to the non-rotating type of hand hammer rock drill.

The Los Angeles Railway Corporation used these breakers for cutting openings on either side of the rail through 6 in. of concrete having a covering of 2 in. of asphalt. The openings were about 23 in. long and extended 17 in. on each side of the rail. In this work it was found that two men with one paving breaker could cut twenty-two of these openings in nine hours. Under the old hand method this work would have required fifteen men. These openings were cut in order to give gripping place under the rail for the use of hydraulic jacks to pull the rail out.

The paving breakers are usually used in conjunction with the Imperial type 14 portable air compressors, which are either gasoline or electrically driven.

Letter to the Editors

Suggested Changes in Safety Car Design

TRENTON & MERCER COUNTY TRACTION CORPORATION

TRENTON, N. J., May 12, 1921.

To the Editors:

In a recent issue of the *ELECTRIC RAILWAY JOURNAL* there appeared an article by J. C. Thirlwall entitled "Why Alter the Standard Safety Car Design?" I am heartily in accord with most of Mr. Thirlwall's objections to fundamental changes in the general design of the standard Birney safety car, but our experience in the operation and maintenance of this type of car has convinced us of the desirability of several changes which could be made without sacrificing the essential features, such as dimensions of car body and low wheels.

In the March 12 issue of the *ELECTRIC RAILWAY JOURNAL* mention was made of the substituting of longitudinal seats running the full length on either side of our cars in place of the standard transverse seats. The object of this change was to determine whether the increased aisle width thus provided would not facilitate the loading and unloading of passengers at points of heavy interchange here in Trenton. The effect of this change has been to speed up passenger interchange and has tended to give a more even distribution of the passenger load over the entire car. Most of the crowding on the front end of the cars was due to the passengers' inability freely to move to the rear of the car on account of the restricted aisle space. By increasing the aisle width this handicap has been removed.

There are two other changes in the construction of the safety car which the management here feels would be beneficial and which could be made without increasing the weight or dimensions of the standard car. These are the substitution of a longitudinal seat for the first transverse seat at each end of the car on the entrance side and the elimination of the folding door opening outwardly by substituting a sliding door.

In regard to the safety features, we are considering changes to make the foot valve inoperative. With the many duties which are necessary for the one-man car operator to perform, there is a tendency to abuse this auxiliary to the controller pilot valve, and in considering the accidents which have occurred here in Trenton it has been found that this feature has been directly responsible for a large number.

Another improvement which could be advantageously made in the interests of safety is the removal of the door operating position from the brake valve. By eliminating this feature the brake valve could be redesigned so as to give more space between the various brake valve positions and thus decrease the liability of error. A number of accidents have been caused here due to the fact that in making a service brake application the operator sometimes throws past the service position to lap position, which is between the door opening and service application positions on the brake valve. If more space were available, a longer port and a greater radius could be obtained for the service application position, and the lap position could be moved

further away so that there would be less liability of mistake by the operator. While these two changes may be considered quite radical, we feel that they have a special appeal to maintenance men and operators.

H. E. KROUSE, Master Mechanic.

Association News

Acting Secretary Welsh Addresses Yale Students

A PERSPECTIVE view of electric railway problems was given in a course of two lectures by James W. Welsh, acting secretary of the association, before the engineering students at Yale University, New Haven, Conn., on March 6 and 13.

He first dealt with mechanical and electrical studies such as the application of motor control and auxiliary equipment to railway cars and the economic problems connected with the replacement of old reciprocating type of plants by power generated in large central stations. In the former the development of the present high-speed motor was illustrated by the redesign of a standard city motor for interurban service.

The second lecture took up the traffic problems of a city system, illustrating the surveys to be made, the means of fitting the service to the traffic, and a review of the methods now employed for securing the maximum economy in car operation. The preparation of a working schedule or time-table was shown, starting with the traffic count and with special consideration given to the determination of the trainmen's runs as limited by the rules of the labor agreement.

Mr. Welsh employed a conversational method of questions and answers with the students and pictured the subject in such a way as to give them some realization of the difficulties involved as well as the attractiveness of the work in the field of transportation as a future business of life.

Heavy Traction Men Meet

A NUMBER of the heavy traction experts in the Engineering Association met on May 12 to round out the report of the committee on this subject. A sub-committee presented a remarkable compilation of data on electric locomotives and multiple-unit cars which was accepted for inclusion in the report with a few additions. A plan was also approved for the preparation of an analysis of conditions affecting the use of multiple-unit versus locomotive-drawn trains for suburban service, as a substitute for the statistical summary originally planned. The desirability of co-operation among heavy traction committees of national societies was again emphasized and a determination to push this matter was registered. The committee finally decided to compile a subject bibliography on heavy traction to be used as an appendix to its 1921 report.

Those in attendance were Sidney Withington, New Haven Railroad, chairman; A. H. Armstrong, General Electric Company; H. W. Cope, Westinghouse Electric & Manufacturing Company; J. C. Davidson, Norfolk & Western Railway; C. V. Duer and J. S. Sloan, Pennsylvania System; C. H. Quereau, New York Central Railroad; L. S. Wells, Long Island Railroad.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Radial Scheme Favored

Mr. Arnold Believes Ambitious Canadian Project Entirely Feasible Under Competent Management

Bion J. Arnold, Chicago, considers that the radial program of the Ontario Hydro-Radial Commission is very advantageously situated with regard to density of population, active industrial territory and probable increases of both these factors in the future, as well as having the advantage of a plentiful supply of cheap power.

In testifying before the commission during the week ended April 30 Mr. Arnold pointed out that carload shipments in large volume have not usually been handled by the average interurban electric line, but that with the type of construction and facilities proposed by the Hydro-electric Commission for the radial lines, they would be in a position expeditiously and economically to handle a reasonable amount of carload freight business.

Taking into consideration the estimated population in 1925, 1930 and 1935 of the various territories served by the different lines, Mr. Arnold showed three lines, the Toronto & Eastern, the Toronto Suburban and the Hamilton & Elmira divisions, as having slight deficits in 1925. He pointed out, however, that these deficits were figured on construction costs estimated at the high peak period of about a year ago. In view of reductions in cost since that time he thought that the newly constructed lines might be found to pay from the start. The Toronto, Hamilton & St. Catharines and the Niagara, St. Catharines & Toronto radials, he estimated would be paying propositions right from the start, having a net income or surplus of \$145,000 and \$129,000 respectively in 1925.

\$800,000 SURPLUS ANTICIPATED

By 1930 Mr. Arnold estimated that the whole system would show a surplus of \$796,000 on the year's operations, and by 1935 this would be increased to more than \$1,000,000.

One point emphasized was that of terminal facilities and grade separation in the cities. The radials must be able to enter and leave the cities at high speed. Regarding the proposed Toronto terminal at Bay Street, he suggested a combination of elevated structure and subway leading from it. The overhead track would end at Front Street, and the cars would then enter a subway extending up to Queen Street. He favored an uptown terminal nearer the business center, but was not ready to state just where this should be located.

The radials would have an advantage in handling less-than-carload freight.

Summing up the transportation requirements, it would appear that the area in which the system is proposed, being the center of population and manufacture of the province, should be provided with every transportation service which will aid its commercial and industrial welfare. This should include transportation facilities of the type proposed by the Hydro-electric Power Commission, the main feature of which is frequent passenger transportation at high speed, supplemented by frequent and prompt deliveries of less-than-carload freight.

LARGE CAPITAL EXPENDITURES REQUIRED BY STEAM ROADS

For the steam roads to give the facilities required and proposed by the Hydro-electric Commission, they would have to make large capital expenditures and would also have to organize additional operating departments properly to handle the different classes of service required.

Regarding fast freight service, Mr. Arnold recommended that as it is proposed to furnish this to all points on the line. This freight would be carried on interurban express and on freight cars which, as a rule, would make two trips daily between the various terminals, providing for one-day shipments from point to point.

The estimates as to earnings had been made separately for the five divisions, and all passenger-earning estimates are based upon population figures and data as to the riding habit of the residents of each locality.

While the system as a whole cannot be compared with any existing interurban, combining, as it does, rapid transit, suburban and interurban features, with despatch and carload freight traffic, each of these classes of service has its parallel in existing systems, and when analysis of the estimated operating costs of these classes of service has been made, they lead to the conclusion that the project now outlined as a whole is feasible, and that if constructed and operated under competent management, with the support of the communities served, success for the road can be reasonably expected.

Readers, Note Well

The United States Civil Service Commission announces an open competitive examination for senior signal engineer. Applications must be filed with the Civil Service Commission, Washington, D. C., prior to the hour of closing business on June 7, 1921.

Union Contract Renewed

Winnipeg Railway Makes Reservations on Wages and Rejects "One Big Union" Idea

The Winnipeg (Man.) Electric Railway has signed an agreement with its motormen and conductors for the next twelve months, granting the trainmen the same wages and working conditions as prevailed last year.

The 1920 agreement was made between the company and "the Street Railway Men's Union," an independent organization with no affiliation with the Internationals or any other body. After the agreement of May 1, 1920, had been signed the trainmen joined the One Big Union—a political organization with revolutionary tendencies which was directly responsible for the strike of six weeks in Winnipeg in 1919.

When the 1920 agreement was about to expire the Street Railway Men's Unit of the One Big Union demanded that the company sign its agreement with them as representing the O. B. U., thus giving recognition to this body. This the company positively refused to do and declined to negotiate with the O. B. U. at all.

EMPLOYEES WITHDRAW DEMAND FOR UNION RECOGNITION

The company said it was prepared to negotiate an agreement with a committee of men, but that if the men insisted on recognition of the O. B. U. the company would go to arbitration and open up the whole agreement as to wages and working conditions. After several mass meetings the demand for recognition of the O. B. U. was withdrawn, the men appointed a committee to represent them, and an agreement was signed on May 9 between the company and "Motormen and Conductors of the Winnipeg Electric Railway as represented by a committee executing this agreement."

In all its agreements so far executed with its employees the company has stipulated that it will maintain the same rate of wages as prevailed last year.

The agreements contain a clause, however, which says "if at any time during the currency of this agreement, by any reason of something beyond its control the company is deprived of any considerable portion of its revenues, and is thereby rendered unable to pay the wages herein agreed to, the company shall be at liberty to give thirty days' notice to terminate this agreement insofar as it affects the rates of wages."

Wages Reduced by East Mass. Arbitration Board

Cut Made Averages 12½ per Cent—Burdensome Seniority Rules and Other Provisions Modified

An average wage reduction of 12½ per cent, elimination of burdensome seniority rules and certain overtime and special allowances featured the decision handed down by the Massachusetts Board of Conciliation and Arbitration in the case of the Eastern Massachusetts Street Railway and its employees who are members of the Amalgamated Association. The ruling of the board was announced on May 14, but is retroactive to May 2, the date when the former agreement expired, to be in effect for one year to May 1, 1922. An immediate reduction in fares is planned.

PRIOR to the expiration of the old agreement the trustees of the Eastern Massachusetts had announced that wages would be cut 20 per cent, and further proposed to cancel the entire agreement. Threats of a strike on the system were heard, and up until the last day of the old agreement it appeared as though no settlement could be made which would avoid a walkout of the men.

On the final day, however, both sides agreed to submit the case to arbitration by the State Board, and arrangements were made to have the case heard and settled promptly. Before going to the board the trustees and the men drew up a new agreement, leaving only the questions of wages, overtime and certain other provisions, twelve points in all, to be arbitrated.

Public hearings were commenced on May 5 and completed on May 9, the decision being given five days later. The case for the company was conducted by Arthur G. Wadleigh, himself one of the trustees. The employees were represented by Attorney James H. Vahey.

Evidence relating to the decline in cost of living was introduced by both sides, Prof. Albert S. Richey testifying as a witness for the company, and Arthur Strugis, connected with the statistical bureau of W. Jett Lauck at Washington, as a witness for the union. Professor Richey produced figures indicating an average decline in the cost of living since May 1, 1920, of 22½ per cent, and predicted a further slow but continuous reduction in prices. Mr. Strugis contended that costs are still double the pre-war basis, and that any apparent decline is only a temporary seasonal fluctuation.

The company introduced statements relative to the still precarious financial condition of the property, and although the attorney for the employees claimed it should not be considered in fixing wages, the board did not rule it out. What consideration the board gave to this matter, if any, the members did not state in their finding, although they referred to it as having been introduced.

The new scale of wages for motormen and conductors will be 49 cents, first 3 months; 52 cents, next 9 months; and 54.5 cents thereafter, as compared with 56, 59, and 62 cents respectively under the former agreement. The differential of 5 cents for operators of one-man cars remains unchanged, al-

though a strong effort was made by the union to have it increased to 15 cents. Nearly 90 per cent of the car mileage of this property is operated with one-man cars.

The old and new rates fixed for other employees under the amalgamated agreement is as follows:

REPAIR SHOP AND ROLLING STOCK			
Occupation	Old Rate	New Rate	
Assemblers	62	54.5	
Blacksmiths	62	54.5	
Blacksmith helpers	58	51	
Babblers	60	52.5	
Carpenters	62	54.5	
Carpenter helpers	58	51	
Car cleaners	58	51	
Firemen	62	54.5	
Machinists	63	55.5	
Machinists helpers	58	51	
Painters	62	54.5	
Pattern makers	62	54.5	
Pitmen	61	53.5	
Pitmen helpers	58	51	
Upholsterers	61	53.5	
Upholsterers helpers	58	51	
Watchmen	63	55.5	
Winders	58	51	
Winders helpers	62	54.5	
Wiremen	58	51	
Wiremen helpers	64	56	
Letterers	62	54.5	
Tuckmen	58	51	
Truck helpers	58	51	
General helpers	62	54.5	
Electricians	58	51	
TRANSPORTATION DEPARTMENT			
Crossing tenders	58	51	
General helpers	58	51	
POWER PLANT			
Assistant engineers	76	66.5	
Firemen	66	58	
Foreman of helpers	66	58	
Firemen helpers	62	54.5	
General helpers	59	52	
Oilers	62	54.5	
Pipe coverers	66	58	
Repairmen	64	56	
Substation operators	62	54.5	
Switchboard operators	65	57	
Holisting engineers	68	59.5	
ROADWAY DEPARTMENT			
Trackmen	58	51	
LINE DEPARTMENT			
Linemen	67	59	
Linemen helpers	59	52	
STORES DEPARTMENT			
Chauffeurs	58	51	
Helpers	58	51	

The twelve specific issues arbitrated and the board's decision in each of the issues were as follows:

1. Shall basic wages be reduced to the scale in effect April 30, 1920? Answer: That there shall be a reduction in the basic rate now in force of 12½ per cent. Where this reduction when applied to the hourly wage results in a fractional part of a cent a fraction of five mills or less shall be paid for as half a cent; fractions over five mills shall be paid for as 1 cent.

2. Shall there be any change in the differential paid to men while operating one-man cars? Answer: That there shall be no change in the differential of 5 cents per hour paid to operators of the one-man car.

3. Shall seniority be abolished? (A) in shops; (b) in carhouses; (c) in track departments; (d) in power plants; (e) in the line department? Answer: Yes, in all classes specified.

4. In case of a curtailment of force shall

employees hold their seniority rights for a period of six months so that in case of increasing force they shall be returned to the service in accordance with such seniority before any new men are hired? Answer: No.

5. Shall the computation of time for runs of conductors and motormen be changed from computation to fifteen minutes and half hour periods to computation to ten minute periods? Answer: No.

6. Shall relief for thirty minutes or less be paid for? Answer: Yes.

7. Shall employees in the mechanical and miscellaneous departments be allowed ten minutes under pay to wash up? Answer: No.

8. Shall men in the mechanical and miscellaneous departments who work eight hours on Sundays and holidays and nine hours on week days be paid nine hours' pay for the eight hours' work on Sundays and holidays? Answer: No.

9. Shall employees be paid at the rate of time and a half for work done on Sundays and holidays? Answer: (A) In shops, in carhouses, in track department, in power plants, in the line department. No in all classes specified.

10. Shall employees in the mechanical and miscellaneous departments when doing overtime work be paid compensation in addition to their regular hourly rates? Answer: Yes, at the present rate of time and a half.

11. Shall employees in the rolling stock shops be allowed Saturday half holiday with pay? Answer: No.

12. Shall it be provided that regular employees of the mechanical and miscellaneous departments, who have worked one continuous year or two consecutive full track seasons, shall not have their wages reduced by reason of occasional rainy or inclement weather? Answer: No.

The decision of the board affects in all about 1,850 out of the 2,400 employees of the Eastern Massachusetts Street Railway. Both sides had agreed in advance to abide by the decision of the arbitrators.

The following brief statement was included in its official findings, as the basis of the board's decision:

It appears that the increase in wages received by the employees upon this system since Oct. 1, 1914, has exceeded in percentage the increased cost of living during the same period. The board recognizes that the justification for such increase was not entirely based upon the increased cost of living. It is generally recognized, however, that such increase has been the controlling factor in justifying the increase in wages of the employees during this period, and further that there has been a substantial decrease in the cost of living, the official report of the Massachusetts Commission on the "Necessaries of Life," covering the period to May 1, determining such decrease from July 1 to be 18.8 per cent. After an examination and consideration of the evidence, including exhibits twenty-eight in number, together with the able arguments of counsel, the board determines that a reduction in wages is warranted at the present time.

The board finds sufficient reason for including in the new agreement certain of the working rules and conditions submitted, but as to the remainder, whatever reason there may have been for their adoption, the board finds no sufficient justification to warrant their continuance.

In accordance with their promise to the public, the trustees of the Eastern Massachusetts Street Railway are planning to put a reduced scale of fares into effect in the immediate future. As soon as the percentage of the wage reduction was made known, they commenced the preparation of a new scale of ticket fares, all over the system, which they expect to announce within a few days.

Nova Scotia Company Cuts Pay.—A general wage cut of from 8 to 10 per cent was put in effect on May 1 by the Cape Breton Electric Company, which operates the interurban tram lines of the island.

Deferred Payment of Taxes Proposed

A bill which would require electric railways operating in Connecticut to pay up their back taxes within a period of six years has been reported by the finance committee of the Connecticut Legislature. The amount of unpaid taxes due at present is about \$2,000,000. The bulk of this approximately \$1,800,000 is owed by the Connecticut Company.

The measure would require each year the payment of one half the annual net income of the companies, in addition to the tax for that particular year. It would go into effect on July 15, 1922, and the taxes for the present year would be deferred until that time, and added to the total of unpaid taxes. Companies which pay up their indebtedness within six years' time would under the provisions of the bill pay interest at the rate of 4½ per cent, while from those not completing payments 8 per cent would be levied. By the time the first payment would come due, it is estimated that the Connecticut Company would be in debt to the State to about the sum of \$2,500,000. The first payment would be in the neighborhood of \$750,000.

The president and treasurer, or receiver, of a company would be required to file an annual statement under oath showing the amount of each item, of which the gross and net income respectively is made up. The net income is to be computed by deducting from the gross income items of operating expenses, expenses of auxiliary operation and leased roads, miscellaneous rents, taxes paid, interest on funded debt, interest on floating debt and miscellaneous charges for the preceding year.

Unions May Be Sued in Massachusetts

An amendment to the General Law of Massachusetts, governing voluntary associations, has just been enacted, which permits all such associations to be sued. The progress of this amendment through the Legislature was marked by the most bitter opposition on the part of organized labor interests. The representatives of labor claimed that the bill was aimed directly at the unions, and sponsored by the financial interests, as it lays the union organizations, as well as other associations of individuals, open to suit.

The objection of the union interests was directed less against the principle of subjecting them to suit, than to the alleged liability of having their funds tied up by employers bringing suit when a strike may be in progress. This, the union interests claim, may be resorted to, in order to break a strike, as the union would be unable to pay its members strike benefits, and expend funds for other purposes which are considered essential in the conduct of a strike.

The strike was termed labor's only weapon, and this legislation was con-

demned as an attempt to weaken labor's one source of strength.

In spite of this opposition the amendment was passed and sent to the Governor. The labor people then carried their fight to the Governor's office, urging him to veto the bill. After hearing all the objections and giving due consideration to the subject, Governor Cox signed the bill. He made a public statement on the matter, saying that the bill was not aimed at labor, but it included a number of other voluntary associations, all of which should be subject to suit at law as well as labor unions. He called attention to the fact that similar legislation is in force in twelve other states, and advised the labor unions that their interests were sufficiently protected.

Day of Emergency Rates Gone

The Board of Public Utility Commissioners of New Jersey will no longer allow temporary rate increases to cover so-called emergency periods, Chairman John J. Treacy of the board announced on May 17, and added that all the factors of a normal rate-making case must be before the board before a decision is made.

Chairman Treacy declared that the theory will no longer hold that was developed during the war to the effect that temporary rates must be granted to tide utility concerns over a period of abnormal costs.

The announcement of Chairman Treacy was made when Rankin Johnson, president of the Trenton & Mercer County Traction Corporation, appeared before the board seeking a date for the cross-examination of Ford, Bacon & Davis, who appraised the company's property for the State when the railway applied for an increase in fare of from 7 cents to 10 cents.

According to law the commission must render a decision in the case by May 31, otherwise the company has the right to put into effect the 10-cent rate.

Mr. Johnson was asked to agree to an extension of this time until June 15, stipulating upon behalf of the company that the new rate would not become effective until the board reached its decision. To this Mr. Johnson demurred, declaring that an emergency existed and that the company's financial situation was desperate. He asked that a temporary rate be granted until the permanent rate could be formally established.

Chairman Treacy of the board in the course of his remarks said:

The board is reluctant to extend a theory which was developed to cover a national emergency, the war, beyond the period of the emergency itself. This board is not going to grant any emergency applications unless the situation is so critical that it is imperative for it to do so.

Commissioner Harry V. Osborne indicated that he thought that continual changing of utility rates was unsettling to the public and to financial conditions generally. The board fixed May 31 for the continued hearing in the Trenton case.

Large Area for Future Development Opened

Governor Miller of New York recently signed the bill proposed by Senator Smith of Staten Island which will give Staten Islanders rapid transit facilities between Richmond and New York City within three years. For over twenty years residents of the island backed by big business interests have fought for a transit connection between the Borough of Richmond and Brooklyn. The passage of the new law will require the city to begin within two years the construction of a passenger and freight tunnel between the two places. Governor Miller commenting on the bill said:

Such a tunnel must necessarily be a part of any comprehensive plan for the development of the port. Indeed, it appears to me that it is one of the obvious things that may speedily be done to relieve congestion and to eliminate much of the costly with a terminal service now required, for by that means it should be possible to provide direct service from the transcontinental railroads to a large territory with a rapidly growing population now cut off from such service. Such a tunnel, with proper connections, will bring the transcontinental railroads to the very centre of the great metropolitan district.

The city of New York already is expending a large sum in the construction of docks on Staten Island and it would seem that transportation means other than by water between Richmond and the other boroughs should be provided as speedily as possible.

The need of such a tunnel is obvious. Its building has now been too long delayed. Nothing can be done under this bill before another session of the Legislature.

Electric Equipment Sale May Settle Title Question

Because he built on an island, made in the middle of the bay, title to which bottomland has been vested in the city but without the right to transfer it, Carl G. Fisher, developer at Miami, Fla., has offered to sell for \$1,125,000 an electric power house for lighting and power, carhouses and other equipment that cost him \$1,265,403. By the purchase the tangle over the title question would be settled. The island was built up by the Fisher interests after the bay bottom had been purchased. Mr. Fisher also offered to sell the trolley line of the Miami Beach Electric Company to the city, "and not at a profit either."

At the conclusion of the general discussion, the offer having been made in an open meeting of the City Council, City Attorney S. P. Robineau was authorized to go to Tallahassee, the state capital, to take up with the Internal Improvement Board the question of title, with the hope that there might be still some way out of the tangle. The tangle actually dates back to a state law a dozen years ago, deeding to Florida cities all submerged lands within their corporate limits, but with the proviso that title shall always be vested in the municipality. Later the Fisher interests approached the Internal Improvement Board, which controls state lands, and neither thinking of the state law, the board sold the Fisher interests eleven acres of bay bottom.

Municipality Follows Up Its Advantage

The figures of the Detroit (Mich.) United Railway on the cost of constructing the 25 miles of day-to-day lines which the city electors voted to take over have been submitted to the city. The total cost of these eight lines is placed at \$1,965,942, or approximately \$80,000 per mile. Accountants for the city will check over the figures submitted by the company and engineers for the city will go over the lines with the company's engineers to determine depreciation.

Arbitration of the construction costs and depreciation will be urged by the city as soon as the figures have been gone over, since Mayor Couzens is anxious to have the question of costs settled before the city declares itself ready to take over the lines. E. W. Bemis, Chicago, has been retained by the city to appraise the eight day-to-day lines.

Announcement has been made by Mayor Couzens that the electors of Detroit will be asked to vote at the next election on the question of giving the Street Railway Commission power to acquire the Fort Street and Woodward Avenue lines, Detroit United Railway lines for which the franchises have expired. This is the first action taken in regard to these lines since the April 4 election when the company's service-at-cost plan was defeated.

Railway Firm—Will Not Arbitrate

Prospects seemed remote on May 13 for the early resumption of service on the Scranton, Montrose & Binghamton Railroad, Scranton, Pa., shut down since April 18. Union officials were still firm then in their stand not to permit the employees to accept a cut in wages or permit the working conditions to be modified except by arbitration. The railroad management was equally firm in its stand not to arbitrate a matter where the possibility existed of its not being able to carry out the arbitration decision. The line runs between Lake Winola and Montrose, Pa.

Failure to agree with the employees over a new contract for wages and working conditions forced the company to suspend service. The company made a contract in 1916 with its trainmen for four years, at a maximum of 30 cents an hour, but voluntarily increased wages each succeeding year, granting two advances in 1920, so that the trainmen in April, 1920, were receiving 60 cents an hour, with other employees paid in proportion.

Shortly before the April, 1921, agreement expired the operating statements of the company were placed before a committee of the employees for their consideration. They showed that the company was fast losing money with wages taking 68 per cent of the revenue. Accordingly the men were asked to take a reduction of 25 per cent. This proposal they flatly rejected.

In a final effort to reach an adjustment the company suggested a 12½ per cent reduction in wages and modification of the working agreement so the company could use one-man cars wherever the management thought it practical.

The company stipulated that if anything were made above fixed charges during the year of the contract, the sum so earned would be applied in the form of an additional wage payment, thus cutting down the 12½ per cent wage reduction. This plan was also rejected, but by a small majority vote.

The men wanted the whole matter arbitrated. This the company has refused to do. The villages along the road have been hard hit, as they depended upon the power plant of the railroad for lighting and power, but an agreement has been made with the power-house men to work at the old scale and the consumers have submitted to an increase of 40 per cent in rates to meet the extra expense which is entailed.

Indeterminate Grants to Be Accepted

The Citizens Gas Company and the Indianapolis Street Railway are preparing to surrender their franchises granted by the city of Indianapolis and operate under indeterminate permits granted by the Public Service Commission, it is understood at the office of the commission. The railway franchise provides for the sale of six tickets for 25 cents, but its provisions have been set aside by the commission, under the emergency relief section of the public utility law.

The Legislature of 1921 authorized utilities operating under franchises from cities to surrender the franchise and operate under the 1913 act creating the State Public Service Commission. Under a section of the 1913 law, any public utility under an emergency can be operated during the emergency under the commission regardless of its franchise. It is under this section that the gas company and the railway are operating temporarily.

Program of Meeting

Pennsylvania Street Railway Association

The Pennsylvania Street Railway Association will hold its annual meeting at the Penn-Harris Hotel, Harrisburg, Pa., on June 16 and 17. One of the prominent speakers will be P. H. Gadsden, president of the American Electric Railway Association. Topics that are of vital interest to the industry will be touched on, such as Financing, Handling of Materials and Supplies, and a paper from an official of the Pennsylvania State Chamber of Commerce on the Value of Co-ordination and Friendly Relations Between the Merchant, Street Railway and General Public.

Details of Detroit United Wage Reduction

Final agreement having been reached between the Detroit United Railway and representatives of the platform employees regarding the wage reductions, notices have been posted by the company stating the change in rates of pay effective on May 1, as affecting motormen and conductors. The rates of pay made retroactive from May 1 for motormen and conductors in passenger and freight service are: 55 cents an hour for the first three months; 58 cents an hour for the next nine months, and 60 cents an hour thereafter.

Regular motormen and conductors will be paid time and one-quarter for extra or tripper work on week days. Time and one-half will be paid for extra or tripper work for Sundays or holidays, and also for the time in runs in excess of eight hours on Sundays and holidays.

The time intervening between the completion of regular runs and the starting time of extra or tripper work will be paid for at the regular rate of pay, when such intervening time does not exceed five hours. The limit of five hours thereby established for the time intervening is not to apply to men operating day runs.

A minimum guarantee of two hours at the overtime rate will be paid night men when they are required to report for and operate an a.m. tripper in addition to their regular run.

Extra men when required to operate tripper or do extra work after the completion of a regular scheduled run will be paid time and one-quarter for such extra service.

Freight men will be paid time and one-quarter for extra service and for the time in the runs above eleven hours on week days, and time and one-half when required to work in passenger service on Sundays and holidays, except where such service is performed for the purpose of allowing men regularly assigned in the passenger service to be relieved from Sunday duty; and at their regular rate of pay for the time intervening between the completion of their regular run and the starting time of the extra or tripper work.

Penalties for scheduled swing runs will be as follows: For the fourteenth hour, fifteen minutes; for the fifteenth hour, an additional fifteen minutes; and for each consecutive hour thereafter an additional thirty minutes.

Employees on the Port Huron, Mt. Clemens and Ann Arbor city lines will receive 2 cents an hour less than the rate for the other Detroit United Railway platform employees.

Wage Cut in Dubuque.—Trainmen of the Dubuque (Ia.) Electric Company have had their wages reduced from 60 cents an hour to 45 cents. The company recently decided to cut wages and lower rates as a readjustment measure. The trainmen remained at work, but referred the reduction to their officers for consideration.

New York State Arbitration to Begin

The arbitration board in the New York State Railways wage dispute with its employees of Utica, Rochester, and Syracuse will begin sessions at Rochester on May 23. The arbitration board will be composed of Judge Arthur E. Sutherland, of Rochester, choice of both factions as neutral members of the board; B. E. Tilton, vice-president of railway, company arbitrator, and James H. Vahey, Amalgamated counsel, arbitrator for the union employees.

The big issues before the board will be the decision of whether the men shall accept a wage cut averaging 25 per cent and will also work more hours than nine, which is their present working day.

Details as to overtime wages are also to be worked out. The new wage agreement is now in force, but any alterations made by the board will be retroactive from May 1.

Wages Reduced in New Orleans

The employees of the New Orleans Railway & Light Company, New Orleans, La., members of the Amalgamated Association, Division 194, have come to an agreement, through a committee representing them, with the receiver by which, beginning on July 1, 1921, a new scale of wages will go into effect. The new scale affects about 2,600 employees of the company. It reduces the present wages of the men, according to the character of the work performed, from 8 per cent to 25 per cent, and removes all possibility of a strike for another year, beginning April 18, 1921.

Both the employees and the company express themselves as satisfied with the arrangements. There is no change in the working conditions. It is estimated that the new wage scales will save the company from \$300,000 to \$500,000 annually.

Although the wage question has been adjusted little progress has been made toward settling other matters facing the company. The citizens' committee that has been opposing the increase in fare from the franchise rate of 5 cents has suspended its activities for the time being pending action by the Commission Council, after the hearing on the injunction before the United States Supreme Court. Assistant Attorney General Hall of Louisiana is now in Washington, D. C., looking after the matter.

Senator E. M. Stafford, who has taken a leading part in the agitation for lower fares, said on May 14:

I know there is a movement on foot to establish a bus system in New Orleans, which will bring about a material reduction in the cost of transportation. As a matter of fact, figures are being compiled from statistics gathered throughout the country, such as the cost of cars and their up-keep which will enable those directing the movement for a bus system to come to some definite conclusion. If the system is put into operation, books of tickets will be sold so as to provide for a 5-cent fare.

J. J. McLoughlin, who has been associated with Senator Stafford, knew

nothing definite about the establishment of the bus system referred to by Senator Stafford, but said that discussion had been held of a plan to install a twenty-car bus system to run out St. Charles Street to either Jackson Avenue or Louisiana Avenue. Beyond that, he knew nothing.

It was announced on May 15 that C. C. Chappelle, New York, representing Eastern bankers who are interested in the company at New Orleans, would arrive in New Orleans on May 16 bringing with him a new plan on which he hopes that the Commission Council and the bankers may reach an agreement.

News Notes

Arbitration in Little Rock.—Trainmen of the Little Rock Railway & Electric Company, Little Rock, Ark., have opposed the 20 per cent wage reduction proposed by the company and the dispute will be arbitrated. W. J. Terry has been selected by officials of the company and T. M. Mehaffy has been chosen to represent the men. These two men will select the third arbiter. The present contract with the men expires on May 22. This company recently applied for a 7-cent fare.

Try to Force Track Repairs.—Some of the town officials of Cicero, a suburb of Chicago, recently tried to enforce their demands upon the Chicago & West Towns Railway for track repair by barricading the right-of-way. After the cars had run through these barricades Bert Collett, general superintendent, and a supervisor and two motormen were arrested on a charge of disorderly conduct. Later steam rollers were used to block the track until a temporary injunction against the town officials was granted the traction company.

Massachusetts Commission Reports Living Costs Decrease 20 Per Cent.—The Massachusetts Commission on Necessaries of Life has recently issued a report indicating a reduction of 17.9 per cent in the average retail price of commodities as compared with peak prices during the summer of 1920. The report cites a group of commodities costing \$202.60 last July as now selling for \$166.40. In the case of food-stuffs the decrease is approximately one-third and clothing about 30 per cent. Fuel and rents, however, still maintain high levels.

Open Shop in Eureka.—A strike of the trainmen of the Humboldt Transit Company, Eureka, Cal., terminated recently with practically a 100 per cent non-union personnel. The men voted to strike on March 18 because some members had been discharged for violation of rules. The company refused to arbitrate and mustered about 50 per

cent of crews the morning of March 19 and in twenty days all cars were operated. For several years past the city of Eureka has been about 90 per cent union. It is stated now that about 60 per cent of the business people have been converted to the open shop plan.

Valuation Bill Signed by Governor.—Governor Miller of New York on April 27 signed the Knight bill amending the law under which the Transit Commission in New York City was created, so as to make the earning ability of traction companies at the rate of fare to which they are limited by contract or franchise stipulations a determining factor in valuation. The act also brings suburban and interurban transit lines operating within New York City under the jurisdiction of the new Transit Commission. The terms of the measure were reviewed at length in the ELECTRIC RAILWAY JOURNAL for April 23, page 786.

Committee to Examine Pittsburgh Situation.—The Pittsburgh Chamber of Commerce has notified the City Council of the appointment of a special committee to study the electric railway situation in Pittsburgh and report on the best solution of any difficulties that may be found to exist. The committee is composed of Samuel Harden Church, president of the board of directors of the Carnegie Institute; George S. Davison, president of the Gulf Refining Company; T. P. Gaylord, acting vice-president of the Westinghouse Electric & Manufacturing Company; A. J. Logan, president of the A. J. Logan Company, and Lawrence E. Sands, president of the First National Bank.

City May Test New Minnesota Act.—According to City Attorney Nelson of St. Paul, Minn., legal action will be taken to test the validity of the bill passed by the recent Legislature putting control of street railway lines under the Railroad & Warehouse Commission. Formal objection by the city will not be made, however, until the St. Paul City Railway takes steps to secure authorization from the commission for issuance of further securities or to obtain an increase in fares. A digest of the provisions of the new law was published in the ELECTRIC RAILWAY JOURNAL for April 30, page 82.

Council Opposed to Wage or Fare Change.—The City Council of Sioux City, Iowa, decided in effect to reject the demands of the Sioux City Service Company for an increase in fares, and through Mayor Wallace M. Short issued a statement saying that the Council is "willing to let" the present arrangement continue in effect. That arrangement provides for a 6-cent fare for a period of three years from September, 1920. The Council also stated that it expects the Service company to make no cut in the present wage scale of employees. This probably will mean the starting of an action in court on the part of the Service company to bring about an increase in fare to either 8 or 10 cents.

Financial and Corporate

\$3,675,050 Increase in Gross Economies Put Into Effect by Receivers at St. Louis Reflected in Earnings—Fare Collections Better

An outstanding feature of the 1920 annual report of the United Railways, St. Louis, issued recently by Rolla Wells, receiver, is that \$500,000 of the increased revenue was due to better fare collections.

Better care in fare collection methods are ascribed by Colonel Albert T. Perkins, manager for the receiver, to the employment of additional car auditors—28 instead of 19—the use of fare boxes, and the weeding out of dishonest conductors. More than 200 men have so far been discharged. At first the union insisted upon arbitration, but after most of the cases had been lost arbitration practically ceased.

Signs carried in the light-box space on the front platforms of cars request passengers to deposit their own fares, and also inform them that “conductors are not permitted to deposit fares except under unavoidable conditions.” The public is being convinced that car service nowadays is practically on a cost basis, and that diverted fares have a direct bearing on the rates of fare. Of collections, the report says:

In the Spring of 1920 the Public Service Commission ordered the Receiver to put into effect on April 11, 1920, a flat fare of 7 cents for adults and a flat fare of 3 cents for children; these rates taking the place of previous cash fare rates of 8 cents for adults and 4 cents for children, combined with the sale of two adult tickets for 15 cents (sold on the cars) and 7 tickets for

50 cents and 50 tickets for \$3.50 (sold at stations all over the City), and the sale of children's tickets 2 for 7 cents.

The result of this order was to reduce the average rate of fare by 0.37 cent—cutting down the earnings \$3,000 per day. This great loss was not offset by any material benefit to the public, as the difference had been borne largely by the casual rider who paid cash or by passengers who were not interested enough to buy 7-cent tickets.

The comparative income and expense statement shows gross operating revenue for 1920 to have been \$20,267,730, as against \$16,592,679 for 1919, an increase of \$3,675,051. The total operating expenses, depreciation and taxes were \$16,712,143, as against \$14,303,639, an increase of \$2,408,504. The net income for 1920 was \$1,083,428, as against a deficit of \$265,781 in 1919, an increase of \$1,349,209.

From Jan. 1 to April 11, 1920, the United Railways cash fare for adults was 8 cents or two tickets for 15 cents (sold on the cars) and 4 cents for children. Tickets in lots of seven for 50 cents and 50 for \$3.50 were sold at stations all over the city. Children's tickets were sold on the cars two for 7 cents. On April 11 the basic rate of fare was reduced to 7 cents and to 3 cents for children.

After the rate of fare had been reduced wages went up. The previous wage agreement expired June 1, 1920, and the State Public Service Commission, acting as arbitrator, raised the wages of motormen and conductors 5 cents an hour. This made the scale 55 cents for the first six months, then 60 cents an hour to the end of the second year, and 65 cents an hour for those

who have served more than two years, the latter class including about 80 per cent of the employees.

This increase in trainmen's wages cost the receiver about \$2,000 a day. No increase was granted to mechanics, carpenters, electricians, printers and members of other unions, but the matter was submitted to the State Public Service Commission for arbitration. The commission held, however, it was not mandatory that they should act as arbitrators. The receiver recently filed a mandamus suit in the Missouri Supreme Court to compel the commission to act, alleging that the commission alone has the right to adjust income and expenses. A decision is expected soon.

The total number of revenue passengers carried in 1920 was 287,405,837 and transfer passengers 154,464,735, total 441,870,572, as against 409,010,329 in 1919. The percentage of revenue passengers using transfers in 1920 was 53.74, while in 1919 it was 53.29.

Direct taxes applicable to railways for 1920 were 7.09 per cent of the operating revenue. In addition to these taxes, the United Railways expended during the year \$318,238 for street paving and furnished free transportation for police and firemen. The total taxes and street paving costs—\$1,785,044—amounted to 0.621 cents per revenue passenger. Injuries and damages for the year entailed an expense of \$1,216,064, or approximately 6 per cent of the gross revenue.

Capital expenditures made during the year included \$60,555 for way and structures, and \$448,554 for equipment, a total of \$509,109, the largest items of which were \$303,292 for revenue cars and \$129,551 for new electric equipment for old cars. During the year 0.1253 miles of track were added, and 0.9828 removed. Track reconstruction totaled 26.50 miles. The total mileage of the system now is, in single tracks, 345.20 of city lines, and 115.52 of county lines, a total of 460.72 miles.

Power for the year costs \$2,198,861, or at the rate of 13.5 mills per kw.-hr. at the d.c. switchboard. On a kilowatt-hour basis 59.4 per cent of the average distribution of power was from purchased water power, 27.6 per cent from purchased steam power, and but 13 per cent generated by the company in its own plants. On the peak loads the basis was 40.8, 25.6 and 33.6 per cent respectively.

The average number of passenger cars operated daily, including Sundays, during 1920, was 1,175, as compared with 1,132 in 1919 and 1,107 in 1918. During the peak hours in some weekdays the number was as high as 1,320.

Reorganization Plan Being Arranged

Reorganization of the Pittsburgh (Pa.) Railways and elimination of the receivership may be effected within the next three months, according to an announcement by Mayor E. V. Babcock, following a conference with other city

INCOME STATEMENT—UNITED RAILWAYS, ST. LOUIS

Year Ended Dec. 31	1920			1919		
	Actual	Per Cent of Operating Revenue	Per Cent Increase	Actual	Per Cent Operating Revenue	
Operating revenue—						
Revenue from transportation:						
Passengers.....	\$20,113,799	.....	22.20	\$16,463,312	.....
Special cars.....	32,791	.....	40.70	23,297	.....
Express.....	8,244	.....	27.18	11,323	.....
Total.....	\$20,154,834	99.443	22.10	\$16,497,932	99.43	
Other railway operations:						
Station and car privileges.....	80,000	.....	18.50	67,510	.....
Rent of equipment.....	455	.....	.....	.....	.....
Rent of buildings, etc.....	12,800	.....	40.80	9,109	.....
Sale of power.....	19,641	.....	8.10	18,128	.....
Total.....	\$112,896	0.557	19.15	\$94,747	0.57	
Operating revenue.....	\$20,267,730	100.00	22.15	\$16,592,679	100.00	
Operating expenses:						
Way and structures.....	\$1,233,332	6.085	5.50	\$1,170,045	7.05	
Equipment.....	1,606,497	7.926	3.90	1,545,241	9.31	
Depreciation reserves.....	1,626,888	8.027	1.95	1,659,268	10.00	
Power.....	2,198,861	10.849	28.20	1,715,604	10.34	
Traffic.....	12,775	0.63	95.00	6,550	0.04	
Transportation.....	6,615,316	32.640	23.20	5,363,205	32.32	
General miscellaneous.....	765,074	3.775	3.80	737,254	4.44	
Injuries and damages reserves.....	1,216,064	6.000	22.20	995,561	6.00	
Total operating expenses.....	\$15,274,807	75.364	11.49	\$13,292,728	79.50	
Net operating revenue.....	4,992,923	24.636	47.20	3,399,951	20.50	
Taxes.....	1,437,336	7.092	29.40	1,110,911	6.70	
Income from operation.....	\$3,555,587	17.543	55.30	\$2,289,040	13.80	
Non-operating income.....	145,855	.719	37.04	106,442	.64	
Gross income.....	\$3,701,442	18.262	54.50	\$2,395,482	14.44	
Deductions.....	2,618,014	12.917	1.62	2,661,263	16.04	
Net corporate income.....	\$1,083,428	5.345	509.00	\$266,781	1.60	

NOTE:—Figures in italics indicate deficit or decrease.

officials, President A. W. Thompson and chief counsel for the Philadelphia Company.

President Thompson outlined his reorganization plan but no details were made public pending the presentation of the plan to the City Council.

Louisville Results Disappointing

James P. Barnes, president of the Louisville (Ky.) Railway, made public on May 5 figures showing that the 40 per cent increase in fares by the company had resulted in an increase in earnings of only 7.49 per cent in the month of April.

In round figures, Mr. Barnes' report shows the gross revenue for the first four months of the year to be 5.09 per cent more than it was for the first four months of last year. For the two months and seven days the 7-cent fare has been in effect the earnings have been 8.56 per cent more than the same period last year. During April just past, the receipts from fares were \$355,085, an increase of \$25,781 or 7.49 per cent over April, 1920.

Mr. Barnes said he hoped the percentage would be increased and believed it would be as people became more used to the 7-cent fare, but that while the company was not discouraged by results to date, the increase in revenue under the higher fare had not been as great as was anticipated.

Samuel Riddle, vice-president, said he was confident fewer persons were riding in jitneys than there were a month ago. He believed the jitneys would gradually withdraw from service owing to the cost of maintenance and inability to run on regular time schedules at 5 cents.

The 7-cent fare went into effect in Louisville on Feb. 21.

Deficit of \$142,030 in Cincinnati in Four Months

Figures of the monthly report of the Cincinnati (Ohio) Traction Company for April filed with William Jerome Kuertz, Director of Street Railways, when compared with other monthly reports since January, show that although there is a deficit on hand at the end of each month, the deficits are being cut down gradually. This is with ex-

ception of the month of February, when the deficit was the largest of the year to date.

During the month of April the gross receipts from all sources totaled \$775,952. The gross expenses were \$806,202, leaving a deficit for the month of \$30,249.

The number of fares collected during the month shows a decrease of 1,103,332, for the number collected during April, 1920. Mr. Kuertz believes that economic conditions combined with high fare are responsible for the falling off in the business of the company as compared with last year. The report states that the cost of service in April was 8.95 cents per revenue passenger, while the income was 8.61 per revenue passenger.

The total accrued deficit of the traction company to date, according to its claims, is \$806,426. The city of Cincinnati dispute these figures pending a decision by the courts on their contentions that the company allowed the Ohio Traction Company and the Cincinnati Car Company to earn large profits at its expense.

The accrued deficit up to Jan. 1, 1921, which had accumulated since a former deficiency was funded under a refinancing plan, amounted to \$664,395. The

Commerce Body Would Explain Refinancing to Public

In order that the citizens of Cincinnati may have an opportunity fully to understand the provisions of the proposed refinancing of the Cincinnati (Ohio) Traction Company and the Ohio Traction Company, as being formulated, the executive committee of the Chamber of Commerce has asked Mayor John Galvin that when the plan is completed it be submitted to the Chamber of Commerce as the representative of the general public, for its consideration, before final action is taken.

Interborough Loses \$877,000 in Three Months

The income statement of the Interborough Rapid Transit Company, New York, N. Y., for the three months of the current year and for the nine months ended March 31 are shown in the accompanying tables. In the month of March more revenue traffic was handled than in either January or February. Although the net income for the month shows a deficit of \$187,743, it is a better showing than was made in the two preceding months. The net corporate income for the nine months ended

Nine months ended March 31:		1921	1920	Per Cent Change
Gross operating revenue.....		\$41,189,134	\$37,989,848	8.4
Operating expenses.....		27,211,821	23,503,599	15.8
Net operating revenue.....		\$13,977,313	\$14,486,249	3.5
Total taxes.....		2,028,258	1,958,899	3.6
Income from operation.....		\$11,949,055	\$12,527,350	4.6
Non-operating income.....		472,881	422,848	11.9
Gross income.....		\$12,421,936	\$12,950,198	4.1
Interest, rentals, etc., including Manhattan Guarantee.....		15,982,076	14,944,978	6.9
Net Corporate income (exclusive of accruals under the provisions of Contract No. 3 and related Certificates which under these agreements with the City are payable from future earnings).....		\$8,560,140	\$1,994,780	78.5
Operating per cent.....		66.0	61.8	4.2
Passengers carried (revenue).....		756,977,274	702,981,440	7.7

monthly record since then, as claimed by the company, has been as follows: January earnings, \$782,921; expenses, \$814,113; deficit, \$31,192. February earnings, \$707,502; expenses, \$755,497; deficit, \$47,994. March earnings, \$796,418; expenses, \$829,014; deficit, \$32,595. April earnings, \$775,952; expenses, \$806,202; deficit, \$30,249.

March 31, 1921, failed by \$3,560,140 to meet the cost of service, this against a deficit of \$1,994,780 for the corresponding period of a year ago. Since Dec. 31, 1920, the termination of the six months' period through March 31 the end of the nine months period the Interborough's deficit has increased \$877,379.

STATEMENT OF EARNINGS—INTERBOROUGH RAPID TRANSIT COMPANY

Month Ended	March			Feb.			Jan.		
	1921	1920	Per Cent Change	1921	1920	Per Cent Change	1921	1920	Per Cent Change
Gross operating revenue.....	\$4,933,632	\$4,876,561	1.2	\$4,345,109	\$4,468,923	2.8	\$4,940,995	\$4,444,137	11.2
Operating expenses.....	3,147,783	2,829,713	11.3	2,839,513	2,643,978	7.4	3,190,225	2,854,687	11.8
Net operating revenue.....	\$1,785,848	\$2,046,848	12.8	\$1,505,596	\$1,824,944	17.5	\$1,750,770	\$1,589,450	10.2
Total taxes.....	244,544	228,812	6.9	230,790	215,931	6.9	241,654	216,638	11.6
Income from operation.....	\$1,541,304	\$1,818,035	15.2	\$1,274,805	\$1,609,013	20.8	\$1,509,116	\$1,372,811	9.9
Non-operating income.....	51,892	50,426	2.9	50,613	49,446	2.4	54,122	51,046	6.0
Gross income.....	\$1,593,196	\$1,868,462	14.7	\$1,325,418	\$1,658,460	20.1	\$1,563,238	\$1,423,857	9.8
Interest, rentals, etc., including Manhattan Guarantee.....	1,780,940	1,674,975	6.3	1,789,213	1,673,620	6.9	1,789,079	1,676,596	6.7
Net corporate income (exclusive of accruals under the provisions of Contract No. 3 and related certificate, which under these agreements with the city are payable from future earnings).....	\$187,743	\$193,486	197.0	\$463,795	\$15,160	2,958.0	\$225,841	\$252,738	10.6
Operating ratio.....	63.8	58.0	5.8	65.4	59.2	6.2	64.6	64.2	0.4
Passengers carried (revenue).....	91,727,683	91,297,336	0.5	80,092,357	84,193,107	4.9	88,561,712	82,094,063	7.9

Commission Urged to Indicate Valuation Procedure

The city of Minneapolis, Minn., is very anxious that the Minneapolis (Minn.) Street Railway proceed with extensions and with reconstruction on account of paving. It is impossible for the company to attempt this work, however, without being able to stabilize financing, not only for this year but for some years in advance, in order to lay out a constructive program which will properly serve the public. For this reason it has appealed to the State Railroad & Warehouse Commission, under the recently amended law, to "advise us in what form to make application to your honorable body to undertake as soon as possible the valuation of our property that you may be able to authorize the issuance of securities which we can market to secure the money for the improvements which are being called for."

The company explains that it does not wish to press this matter too strongly, but that it does wish to have it understood that "the public improvements which are demanded are dependent upon your action in the matter."

The same request for information was made for the St. Paul City Railway, while the Duluth Street Railway requested an emergency fare of 7 cents with four tickets for 25 cents.

Foreclosure Sale of Providence Roads Ordered

Decrees for the foreclosure sale of the properties of the United Traction & Electric Company, the Rhode Island Suburban Railway, the Pawtuxet Valley Electric Street Railway, and the Cumberland Street Railway, Providence, R. I., because of the default in payment of principal and interest on the bonds, have been entered in the Superior Court at Providence by Presiding Justice Tanner.

The court appointed Arthur A. Thomas as special master in chancery to conduct the sale at such time as Mr. Thomas may hereafter announce and after six weeks' advertised notice. The roads will then probably be purchased by the joint reorganization committee for the United Electric Railway.

The decrees were entered by the court following a hearing upon the complaint of the Central Union Trust Company, New York, trustee, against the United Traction & Electric Company, and the consolidated cases of the Union Trust Company, trustee, against the Rhode Island Suburban Railway, Central Union Trust Company, New York, trustee, against the Pawtuxet Valley Electric Street Railway and the Central Union Trust Company, New York, trustee, against the Cumberland Street Railway.

The special master will put up the property in separate parts and get bids. If the sum of the highest bids for the properties separately is less than the sum offered for the three together, they will be sold together and

the purchase price apportioned as provided by the decree.

Notice has also been given that the plan and agreement of reorganization of the system, referred to at length previously in the *ELECTRIC RAILWAY JOURNAL* were declared operative, with respect to all the classes of securities previously mentioned, on April 23, 1921.

Merger Reported Arranged

The Capital Traction Company and the Washington Railway & Electric Company, Washington, D. C., have agreed on a plan of merger, the Public Utility Commissioners of the district announced on May 18. The details are withheld.

Court Orders Seizure of Equipment Not Paid For

Judge Martin J. Wade of the Federal court at Des Moines, Iowa, on May 13 granted an order to the General Electric Company authorizing it to seize certain equipment in the three substations and power plant of the Des Moines City Railway.

The order was to satisfy claims of the General Electric Company for equipment valued at about \$68,000, which had been furnished largely for installation in the substations of the railway during the past few years. The financial condition of the railway has not permitted it to pay for the equipment. As a last resort the General Electric Company brought suit in the Federal court a few weeks ago. The order made on May 13 is the result.

F. C. Chambers, operating receiver for the railway, was in Chicago consulting with the Harris interests, owners of the Des Moines plant, at the time the order was made public, and there has been no definite announcement from the company as to just what effect the carrying out of the order would have on service.

Over the long distance telephone, however, A. W. Harris told a Des Moines newspaper that he would refuse to put another dollar into the Des Moines plant until the city and company had arrived at an agreement by which the people of Des Moines would meet the situation.

Announcement was made that the General Electric Company would start removing its equipment from the substations May 16.

In the meantime arbiters representing the railway and the union employees are deadlocked over the choice of a third arbiter. A week ago the company named B. F. Elbert, a Des Moines theater owner, as its arbiter, while Rev. J. E. Kirby, who was the third arbiter in the last arbitration over the wage scale, was chosen by the union. Many names have been advanced for the third man without an agreement being reached.

The present working agreement between the company and men expired on March 1.

Financial News Notes

Tax Measure Excludes Electric Railways.—The King tax bill, which was recently passed by the California Legislature, as noted in the *ELECTRIC RAILWAY JOURNAL*, issue of March 19, page 570, does not change the rate of taxation imposed on electric railways of the state.

Bonds of Interurban Road Paid.—The \$855,000 of first mortgage bonds of the Detroit & Northwestern Railway, Detroit, Mich., included in the system of the Detroit United Lines, which matured on May 1, 1921, were taken up from the present holders upon presentation to the Central Union Trust Company, New York.

Ten-Cent Fare Unremunerative.—The receipts of the Worcester (Mass.) Consolidated Street Railway were \$8,230 less for April, 1921, than for the month of April, 1920, when the road operated under a 7-cent fare plan. According to General Manager Henry C. Page it was only because of the present business depression that receipts fell off.

May Buy Railway Property.—It is said that negotiations have been under way for the sale of the Gadsden, Bellevue & Lookout Mountain Railway by the Alabama Power Company which operates the city railway system in Gadsden. The Mountain Railway, as it is called, connects Gadsden and Nocalula Falls. It is expected that if controlled by the Alabama Power Company a park movement in the vicinity of the Falls will be fostered.

Service Resumed at Holyoke.—Service on the Holyoke (Mass.) Street Railways lines between Chicopee Falls and Holyoke, suspended thirty-seven days ago because of jitney competition, was resumed on May 4 following action of the Holyoke Board of Aldermen in banning jitneys from that city. The railway refused to operate its cars in competition with the buses and the Chicopee Aldermen refused to revoke permits. The controversy has been settled by the action of the Holyoke Aldermen.

Receiver for Shuttle Line.—George C. Dunlap has been appointed receiver of the Dallas (Tex.) Standard Traction Company, owner of the Mt. Auburn-Parkview line in an order signed by Judge W. S. Whitehurst. Judge Whitehurst's order further restrained the sale of the property by the sheriff on May 3, as was ordered in a previous judgment. The Dallas Standard Traction Company controls a shuttle line in the city of Dallas about 1½ miles long which was operated under lease by the Dallas Railway until May 1, when the contract between the companies expired.

Traffic and Transportation

Knoxville Decision Expected

Rumor Says Seven-Cent Fare Will Be Granted but Transfer Charge Refused

With the appraisal figures fixed and arguments heard as to the merits of the petition for higher fare, the Tennessee Public Utilities Commission is expected to render a decision within the next ten days as to whether the Knoxville Railway & Light Company of Knoxville, Tenn., may charge a 7-cent fare, with 2 cents additional for transfers, or whether the fare shall remain as it is, 5 cents.

The commission rendered a compromise decision on the appraisal of the property of the company, fixing the valuation at \$5,983,000. Upon this valuation the commission will hold as to whether or not the company is entitled to a higher fare.

The appraisal of the property followed an order made by the state commission on May 21, 1920, following an application by the traction company for an increase in fare. The appraisal was concurred in by the valuation expert for the traction company. The two men fixed the valuation of the property at \$6,234,141, on an historical basis, including superseded property. Of this amount the traction department was valued at \$4,203,247 and the commercial lighting department was appraised at \$2,030,894.

On a reproduction cost basis, using prices for the first six months of 1920, it was found by the appraisers representing the commission and the company that the value of the property would be \$10,362,964.

The engineer representing the city of Knoxville, which is fighting the increase, demurred from the finding of the other two appraisers and refused to sign the majority report. He held that the property value was approximately \$2,000,000 under the majority report.

Attorneys for the city of Knoxville have announced that they propose to carry the matter to a higher authority in the event the decision is against them.

Indications were on May 16, although without official authority, that the commission will grant the 7-cent fare requested, but that the request for 2 cents additional for each transfer will be denied.

Another Auxiliary Auto Service

The Holyoke (Mass.) Street Railway, through its president, L. D. Pellissier, has applied for permission from the Aldermen to run autos on the so-called West Dwight Street line. The company seeks permission to run two buses with a capacity of 30 passengers each. They

will be operated under the same ordinance on which the street cars are operated, which fixes a minimum period of service.

As the West Dwight Street line, if the petition is granted, will require two shifts of men, and as union men will be employed upon it, the jitneys will be operated at both earlier and at later hours than under the old system. An attempt will also be made so to arrange the time of their running as to stagger the service and greatly increase accommodations from downtown to Pleasant Street, West Dwight Street and adjacent sections.

Court Asked to Reopen Galveston Fare Case

The fare case at Galveston, Tex., has been reopened in federal court, and another legal contest is in prospect. This case was recently decided by Judge J. C. Hutcheson of the United States Court for the Southern District of Texas at Houston in a ruling adverse to the railway, when the court held the earnings of the Galveston Electric Company under a 5-cent fare were adequate and declined to permit an increase in rates.

Following arguments on a motion for rehearing Judge Hutcheson announced that he would appoint a special engineer to investigate costs of maintenance and depreciation, unless opposing counsel can agree on certain points involving these questions. Judge Hutcheson intimated that if appointment of such an engineer became necessary, he would be representative of the court and not of either of the parties to the litigation.

Judge Hutcheson's decision holding that the earnings of the company under the present fare charges are adequate was made after a special master in chancery had conducted hearings and had investigated fully the questions of maintenance costs, depreciation, valuation, etc. Judge Hutcheson, however, held adversely to the findings of the special master, Judge Henry J. Dannenbaum, Houston, who found, according to his report, that the Galveston Electric Company can not make a fair and just return on its investment with fares at 5 cents.

The new developments in the case in the motion for rehearing, on the ground that additional evidence is to be presented, is regarded as assuring a reopening of the case. The motion for rehearing, filed by attorneys for the company, alleges that the court erred in deciding against the company on grade raising, depreciation, brokerage, going-concern value, and the court's treatment of operating expenses and maintenance.

Seven-Cent Fare Voted Down in Port Huron

The electors of the city of Port Huron, Mich., voted down the proposition of the Detroit United Railway to increase fares on the Port Huron city lines, which are part of the Detroit United System, from 5 cents to 7 cents, at the April 4 election. The company's proposal was defeated by a vote of 3,200 to 2,026.

As a result of the failure of the proposed increase to carry, wage reductions affecting the employees of these lines were announced by the company to become effective on May 1. The new wage scale proposed by the company calls for rates 2 cents an hour less than the proposed scale for Detroit employees, or 53, 56 and 58 cents an hour.

The State Railroad Commission did not have jurisdiction in the Port Huron case. The proposed increase of fares there would have amounted to a suspension of franchise rights similar to the case when the Detroit City Council granted the company an increase of fares in Detroit even though the rate was fixed at less in the franchise agreements. In the case of the Port Huron Council, the city officials simply refused to act and put the matter of the increased fare up to the voters in referendum. No further action has been taken by the company in as much as the decreased scale of wages on the Port Huron lines went into effect on May 1.

Application for Eight-Cent Fare Dismissed

The Corporation Commission of North Carolina has, upon motion of the Asheville Power & Light Company, Asheville, N. C., dismissed the application of that company for an 8-cent fare in the city of Asheville. In asking for the dismissal of the 8-cent fare case the company applied for authority to increase its gas rates and a date has been set for a hearing on this last application.

It is understood that the action of the company in respect to the railway fare was influenced very largely by conditions prevailing on its gas property, where the need of improvements was great and the earnings from the present gas rates were insufficient to justify additional expenditures. Faced with the necessity of increasing its gas rates in order to furnish adequate service the company was disinclined to inaugurate both higher gas rates and railway fares at the same time, and therefore decided to ask for the dismissal of the railway application with the idea of adhering to the present 6-cent fare if future conditions make this possible.

While the present 6-cent fare is said not to yield a fair return upon the value of the property it is the intention of the company to give this a further trial in the hope that, Asheville being a resort city, the approaching tourist season will bring with it sufficient business to justify the action taken.

Increase Disappointing

Indianapolis Roads Willing to Assume \$1,000,000 Construction Cost for Freight Terminal

Joseph A. McGowan, treasurer of the Indianapolis (Ind.) Street Railway, and attorneys for the company, who appeared before the Indiana Public Service Commission on May 12 concerning the 6-cent fare and 1-cent transfer charge, filed with the commission a document that shows that the four big interurban companies that enter Indianapolis are willing to assume the cost of constructing the \$1,000,000 freight terminal which is proposed on Kentucky Avenue.

FINANCING A PROBLEM

At the present time the officials of the Union Traction Company, the Terre Haute, Indianapolis & Eastern, the Interstate Public Service Company and the Indianapolis & Cincinnati Traction Company are concerning themselves with financing the proposition. In the meantime plans for the construction are progressing with the engineers. It is thought here that there will be no opposition on the part of the Public Service Commission to the proposed construction. Under existing franchises the Indianapolis Street Railway is supposed to provide the interurban companies with freight room, but officials of the interurbans know from the present earning power of the local company that it could not possibly handle such a proposition.

The first move toward the project will be the organization of a separate company as a holding company for the freight project. Stock will be issued, twice as much preferred as common. The common will be held by the four interurban companies and the preferred will be sold. It is the intention to distribute the stock over the entire State where the various interurban companies operate.

John W. McCardle, chairman of the commission, said recently the commission had not decided on the course it will follow in the case of the Indianapolis Street Railway. It may hold a supplemental hearing and issue a new order before the end of the thirty-day period. On the other hand, it may merely issue an order continuing the present fare schedule until June 1, and in the interval hold the supplemental hearing and then issue a new fare schedule order.

697,055 FEWER PASSENGERS

In response to the commission's request, officers of the railway and city officials considered with the company recently the receipts of the railway under the temporary order. The figures were compared with the receipts for the corresponding period last year. Company officers submitted that in April the company carried 697,055 fewer passengers than in April, 1920. General business depression and jitney bus competition were given as some of the reasons.

Mr. McGowan said that if the same rates of decrease prevailed through the remainder of the year the company would lose \$445,000. He showed that of the 3,153,306 passengers carried in April, 1,041,491, or 31.72 per cent, paid the 6-cent cash fare, and the remaining 2,111,815 passengers bought tickets. It was estimated by some, when the commission heard the petition for the present charges, that if passenger business did not fall below that of last year and if 15 per cent of the passengers paid the extra cent, the company would obtain revenue sufficient to keep it going. The experience of the company in the trial period shows that while more than twice that percentage paid the extra 1 cent, the total number of passengers, and consequently the total revenue, fell far below that for the corresponding period last year.

Robert I. Todd, president of the company, and Ferdinand Winter, its attorney, discussed jitney bus competition. George M. Bernard, a member of the commission, requested the officers to produce at the supplemental hearing figures to show the injury done to the company by the jitneys.

Arthur W. Brady, president of the Union Traction Company of Indiana, and Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, filed a petition with the commission requesting approval of a freight terminal arrangement between the city railway and the interurbans using city tracks. The arrangements were made public some time ago. The interurbans request authority to make a special terminal charge of 3 cents a 100 lb. for freight and express.

City After Detroit United Again

Steps leading to the possible reduction of Detroit city fares to 5 cents have been taken by the city officials. A resolution prepared by Councilman Watson directs the Corporation Counsel to advise the Council relative to the proper legal step to take to have the fare lowered. The company has been asked to submit operating figures so that the city can determine whether or not the reductions in the wages of platform employees will allow a reduction in fares.

The fare on Detroit city lines was increased to 6 cents with nine tickets for 50 cents last June by an agreement between the company and the city. The city officials maintain that the increased revenue provided for by the increased fares was to be used to pay increases to motormen and conductors only. The company maintains that other employees were included.

According to the figures of the city's accountants who have audited the company's books in accordance with the agreement when the increased fare was granted, a surplus income had been accumulated up to the end of February, due to the increased fares, in excess of the amount required to pay increases to all employees.

Omaha Hearing Begun

Deficit Under Temporary Seven-Cent Operation—Valuation Figures Presented

The hearing on the application of the Omaha & Council Bluffs Street Railway, Omaha, Neb., for a permanent rate, before the State Railway Commission, was scheduled to begin in the Omaha City Council chamber on May 16. The company is not asking for any specific rate of fare, but demands a rate that will yield a reasonable return on its investment.

The commission issued a temporary rate order effective on Aug. 10, 1919, allowing the company to charge 7 cents for cash fares, with a four-for-a-quarter ticket privilege. In connection with that order the company was directed to file with the commission a physical valuation report. This has just been done.

A copy of this valuation report was handed to W. C. Lambert, corporation counsel, who will represent the city at the hearing. In this report the company sets up the following valuation figures: Reproduction cost new of physical property, based on a four-year average to 1919, \$17,316,833; on 1919 basis, \$19,671,741; allowing for depreciation, as of 1919, \$17,890,765. The following valuation totals include organization and legal expenses, interest and taxes and going value: Reproduction cost new on a four-year average, \$21,740,254; for 1919, \$25,126,177; allowing for depreciation, as of 1919, \$23,291,772.

The company's gross earnings from operations in 1920 were \$4,807,529. A deficit of \$81,586 is shown for that year. Interest on bonds paid last year, \$479,212; taxes, \$427,861; 6½ per cent dividends on preferred stock, \$250,000. No dividends were paid on the common stock during 1920. The report further shows a surplus of \$16,829, for 1919. The total number of passengers carried during 1919 was 70,151,302, and during 1920, 72,033,229. The property account shows 1,142 motors, 119 miles of main track and 2 miles of leased track.

Court Sustains Denial of Ten-Cent Fare

The Jersey Central Traction Company failed to comply with an order of the Board of Public Utility Commissioners that it provide "proper and safe" service for its patrons. This is the conclusion of Justice Kalisch in an opinion filed in the New Jersey Supreme Court on May 5 in which the court affirmed a decision of the Utility Commission denying an application for permission to establish a 10-cent fare. The company operates in Perth Amboy, South Amboy, Sayreville, Matawan, Keyport, Keansburg, Red Bank, Atlantic Highlands and other municipalities in Middlesex and Monmouth counties. In 1918 the company charged 5 cents in each fare zone, but war conditions prompted the Utility Commission to advance rates to 7 cents. A

further increase to 10 cents was sought in an application to the commission in April, 1920, but the company failed to comply with an order to improve service and the plea was denied. It then appealed to the courts. Justice Swayze in the lower court in sustaining the decision by the Utility Commission, said that the evidence showed the service to be insufficient, inadequate and unsafe.

Hearing on Fort Wayne Fares

At a hearing conducted by the Indiana Public Service Commission at Fort Wayne, on the request of the city of Fort Wayne that the Indiana Service Corporation be forced to reduce the price of city fares from 7 cents cash and four tickets for a quarter, it developed that the company's business is 20 per cent less than what it was last year at this time.

The city attorney claimed that more cars are now being operated than are necessary and that if the number of cars operated was reduced the fare could be decreased. The local federation of labor sent a letter to the commission asking that five tickets be sold for a quarter and that the cash fare be adjusted to 8, 9 or 10 cents or whatever figure was necessary to get the required revenue.

Previous to the hearing the company published a large advertisement in the local newspapers which read in part as follows:

The record of the operating expenses and revenues of the company which were checked by both the city and state accountants during investigations for the past four years, show that the following return was earned on the investment of the company: 1917, 1.38 per cent; 1918, 0.83 per cent; 1919, 2.92 per cent; 1920, 7.27 per cent; average for four years 3.3 per cent.

After taking away bond interest from the investors for almost three years and pouring it back into the property for new cars and track improvements, the company during 1920 was able to earn 7.27 per cent. But remember that a public utility company is not like the ordinary industrial corporation which has a chance to build up a surplus from revenues during prosperous times to carry it over the bad years.

This company has earned far less than a fair return for the past four years and even at the present time is not earning 8 per cent, which is the minimum cost of public utility money. Remember even city bonds are selling to yield 6 per cent.

The company believes that its patrons in Fort Wayne want real service first and that they are willing to pay the fair cost of this service. No one has contested the fact that the company is trying to give real service and pay decent wages.

The company is just as anxious to reduce fares as is the rest of the community to have it do so, but they know that fares cannot be reduced without materially curtailing the service. Fares were not raised as early as they should have been and the 5-cent fare and the six-for-a-quarter ticket was not a self-supporting fare at any time during the past ten or twelve years.

The company believes that a well maintained street railway giving real service is what the patrons want in Fort Wayne. You can have whatever kind of service you are willing to pay for.

The matter of equipment betterments was gone into extensively. Mr. Feustel stated that while it appeared that the company was doing a great deal of repair and construction work, in reality less was being done than was necessary to keep the plant and tracks in good repair and he stated that the increase of 70 per cent in the cost of construction made the figures look large.

Utility Commissions' Joint Attack on Wheeling Ruling

Formal attack on the decision of the Interstate Commerce Commission authorizing the Wheeling (W. Va.) Traction Company, operating an electric interurban railway in Ohio and West Virginia, to advance intrastate passenger fares in Ohio to its interstate level of rates was made on May 8 by the National Association of Railway & Utility Commissioners in a motion filed with the Interstate Commerce Commission asking a rehearing of the case and permission to intervene therein.

In the motion the National Association said in part:

The several state railroad and public utilities commissions, on behalf of which this motion is filed, are interested in this proceeding by reason of their desire to preserve their jurisdiction to serve the people of their states in the manner provided by their laws. If the order of the commission in this case shall stand, and if this commission shall exercise, or attempt to exercise, power to make like orders in other cases falling within the precedent thereby established, said commissions will be largely deprived of their jurisdiction over street railroads, or will be compelled to engage in a multiplicity of suits to defend the same.

The purpose of this motion is to secure a review by this commission of the order which has been made herein, and of the findings of fact and rulings of law upon which said order rests, to the end that said order may be set aside, and this proceeding disposed of without encroachment upon the regulatory jurisdiction and power of the State of Ohio, exercised through the commission and the municipalities of that state.

There is no disguise of the fact that this is a carrier proceeding, designed to bring about an increase of intrastate fares for the purpose of producing larger revenue for the Traction Company, regarded as an interstate carrier. The record was made upon the theory that rates which the commission deems unreasonably low may be found discriminatory against interstate commerce. The case was presented to the commission upon that theory, and decided on that theory. There is no evidence of discrimination of any other sort.

We maintain that this commission ought to rule that Congress has conferred upon it power of supervision over street railroad rates practically by stealth, without mention of the class of carriers over which such enlarged jurisdiction was to be created, and without mention of the purpose designed in any of the proceedings which attended the passage of the act held to effect such enlargement.

We point out that when the transportation act was under consideration the representatives of electric railroads stated that they did not wish to come under it. Nobody urged any extension of rate making power as to them. The commission requested only that if interurban railroads were to be affected by the act they be clearly defined.

The decision in the Wheeling case was reviewed in the *ELECTRIC RAILWAY JOURNAL* for April 23, page 789.

Private Suits Against Railway Are Halted

Until the United States Circuit Court of Appeals at Cincinnati settles the Louisville fare litigation private suits seeking to restrain the Louisville Railway from charging a 7-cent fare will be denied. Judge Evans has ruled that the city is the proper defendant and can protect the rights of all people interested in defense of this action. In a suit pending in the Quarterly Court Reuben Ruthenberg, attorney, seeks to sue for himself and others similarly situated to recover from the railway the entire amount paid by patrons in fares in excess of 5 cents since the in-

crease of 2 cents became effective. Should the final decision in the United States Court be unfavorable to the railway and Mr. Ruthenberg's motion be sustained in the Quarterly Court all those who are seeking to recover excess fare amounts will have to join in one petition. The company has been using rebate slips and the Federal Court will provide the method by which the rebates shall be made to the holders of slips so no action will be necessary in the state or county courts for a refund.

Commission Wants Cities to Indicate Desirable Jitney Routes

Suggestion that officials of cities prepare a schedule of routes desirable for jitney travel in preference to having individual jitney men make application for the right to traverse this or that route is made by the Public Utilities Commission of Connecticut through its secretary in a communication to the Manufacturers' Association of Bridgeport relative to the future status of the buses.

The communication indicates that Bridgeport will be permitted to solve its own jitney problem, and it will practically lie within the power of municipal authorities of Bridgeport to recommend what jitney service shall be continued in order to serve the people of the city. It is further indicated that New Haven officials may similarly recommend if they so desire.

The commission in this letter says that if the local authorities, who should be familiar with existing street railway service and local requirements, would lay out such routes it would materially assist the commission and have a tendency to simplify and systematize the whole situation; and further, that after establishment of routes, the individual application to operate over any such routes could be received and acted upon without involving the question of public convenience and necessity.

The letter says:

The law specifically requires that a public hearing be given on each application for a certificate to operate a jitney and that no such certificate be given without a finding of public convenience and necessity. The law is not specific, however, as to the hearing and finding on public convenience and necessity as to the particular route or manner of establishment other than the implication that such finding be determined in each individual case. In the absence of having established any positive mode of procedure the foregoing is submitted informally as a suggestion which at this time seems the most practical course to pursue as applicable to the city of Bridgeport and vicinity. In view of the large amount of work involved all over the State in this matter it is the desire of the commission to start proceedings as early as can be conveniently arranged. The commission is having prepared a form of application for certificate to operate a jitney and same will be ready in a few days.

The commission adds that it has no form for establishment or travel of routes but the same may be informal and submitted to the commission, specifying the routes and asking for a hearing and finding as to public convenience and necessity.

The jitneys were brought under the jurisdiction of the commission effective July 1 as to their convenience and necessity at the present session of the Legislature.

Transportation News Notes

Niagara Fare Advanced.—The International Railway, Buffalo, N. Y., under a joint tariff covering passenger traffic with the Niagara Gorge Railroad, effective on May 1, increased the Buffalo-Lewiston fare one way via the Falls 13 cents. The round-trip will be increased 11 cents. The Buffalo-Youngstown fare one way will be advanced 8 cents and round trip 5 cents.

Decrease in Passengers Carried.—Industrial depression and the unrestricted operation of jitneys until April are given as the reasons for the alarming decrease in traffic on the Youngstown (Ohio) Municipal Railway. In March, 1921, there was a falling off of 50,000 passengers over the previous month and about 500,000 over the corresponding month of a year ago.

Reduced Fare in Dubuque.—A reduced fare rate has recently been put into effect in Dubuque by the Dubuque (Ia.) Electric Company as part of a readjustment measure which included wage reductions. Instead of seven tickets for 50 cents formerly sold, eight tickets for 50 cents are now for sale, with the cash fare of 8 cents remaining unchanged. The increase in fares was made just a year ago.

Petitions for Seven-Cent Fare.—The Virginia Railway & Power Company, Richmond, Va., has petitioned the City Council for a 7-cent fare with the withdrawal of all labor tickets. The company is at present operating on an amended franchise fixing the fare at 6 cents. The franchise expires on Aug. 1. The petition asks that the existing franchise be amended so that the fare of 7 cents may be charged for twelve months.

Emergency Rate Asked.—The Duluth (Minn.) Street Railway has filed a petition with the State Railroad & Warehouse Commission for an emergency fare of 7 cents. The present rate is 5 cents. The increase will be asked for under a provision passed by the last state legislature which permits the commission to grant an emergency rate pending a valuation of the property. The company was unsuccessful in obtaining an increased rate from the city.

Petitions for Decrease.—The Muskogee (Okla.) Electric Traction Company recently petitioned the State Corporation Commission to put into effect a reduction of fares between points in the city of Muskogee and Hyde Park to 10 cents during the park season. The commission granted the request, stating that it was to the interest of both the public and the traction company to make the fare between these points as reasonable as possible during the summer months.

Fare Injunction Refused.—An injunction against the Cincinnati (Ohio) scale of fares has been refused the residents of Lockland and Wyoming by the Hamilton County Court of Appeals. This decision affirmed the lower court. Residents claimed that under a franchise to the Ohio Traction Company in 1900 the road agreed to carry passengers between those villages and the Zoo for 5 cents, and they sought to have that franchise kept in force. The higher and lower courts agreed that since the city owned the streets it has the right to fix the fares to be charged passengers using them for car rides.

Safety Campaign in Massachusetts.—Brigadier-General Leroy R. Sweetser, Commissioner of Labor and Industries of the Commonwealth of Massachusetts, has appointed two special safety committees, consisting of five well-known street railway men and five steam railroad men, to promote safety methods and reduce accidents among employees of the Massachusetts transportation system. The specific work laid out for these committees is to co-ordinate safety work among the various transportation agencies, adopt standard rules and regulations, and to publish bulletins for the guidance of the various properties. The street railway branch of this committee consists of H. B. Potter, Boston Elevated, chairman; G. W. Mitchell, Eastern Massachusetts Street Railway; H. R. Whitney, Springfield Street Railway; G. H. McFee, Boston & Worcester, and Chester P. Rexford of the Union Street Railway.

Receipts Barely Meet Costs in London.—In May, 1920, the Ontario Railway & Municipal Board took over the operation of the London (Ont.) Street Railway during a third strike of the employees for higher wages. The company sells nine limited and seven unlimited tickets for 25 cents under a franchise secured in 1895, and all efforts of the railway to have the fares increased to meet the present-day conditions have failed. A year ago the citizens voted down a proposed increase. Now Vice-Chairman A. B. Ingram, of the Ontario Railway & Municipal Board, announces that the receipts are barely sufficient to meet the costs of operation and the prospects for the ensuing year are rather dark. The employees have dropped their demands for more money, but the railway board finds it impossible with the existent fares to pay for the company's share of paving on streets traversed by its lines under the existing agreement with the city.

Eight Cents in Oneonta.—The Southern New York Power Corporation, operating in Oneonta, N. Y., has been authorized by the Public Service Commission, Second District, to charge for a year from April 20, and thereafter until changed by order of the commission, an 8-cent fare in place of the present 7-cent fare in the Oneonta urban zone, with seven tickets for 50 cents. Tickets need not be sold on cars if

placed on sale at the company's office and at least three other accessible places in Oneonta. The company asked for a 10-cent fare. In reviewing the evidence the commissioner says the company has made out a case showing the need of a 10-cent fare but the experience of the commission shows that the imposition of such a fare may result in a decreased patronage, which would offset any advantage in amount. Even with the highest fare suggested, he says, it is apparent it will not yield the company a fair return. The fare on the "owl" cars, however, is made 10 cents.

People Must Decide on Jitney or Railway.—The City Commission of Bay City, Mich., recently received a communication from the manager of the Saginaw-Bay City Railway operating in Bay City to the effect that either the jitney or the electric railway must go as both cannot survive. He declared that traffic in the city did not warrant two systems of transportation and the increasing jitney competition had rendered successful operation of the electric property practically impossible. Some conclusive evidence was submitted showing how far behind Bay City was in the matter of railway traffic and revenue compared with other cities of a similar class. During 1920 4,099,419 revenue passengers were carried as compared with 6,291,801 in Saginaw, 7,133,370 in Lansing and 7,265,884 in Jackson, though street car service and car-hours traveled were practically the same for Bay City as for other cities of the same class. The company operated at a loss of \$2,600 in January, \$6,800 in February and \$5,800 in March. The City Commissioners want the matter referred to the Public Service Commission.

Relief Sought for Railway.—Operation of jitneys in Houston, Tex., is costing the Houston Electric Company, which owns and operates the electric railway in that city, an average of \$20,000 a month, according to representations made by W. E. Wood, vice-president and general manager, before the board of city commissioners. If the heavy drain made by the jitneys on the company's revenue continues, Mr. Wood informed the City Commission, the traction company can not carry out the proposed improvement program calling for an expenditure of \$450,000. The records show that licenses for 200 jitneys have been issued and it is estimated that practically the entire number are now in operation. The City Commission has no authority to revoke licenses of jitney operators, but an ordinance is now being prepared giving the commission such authority, and its passage seems assured. It is probable that some action will be taken to afford some relief for the traction company. Jitney warfare has been going on now for some time in Houston. The situation became complicated several weeks back when the railway made the removal of its tracks from Main Street contingent on the abolishing of the jitney.

Personal Mention

Mr. Scott Advanced

**Long Practical Experience in Hartford
Well Fits Him to Manage That
Connecticut Company Division**

Nathaniel J. Scott has been appointed manager of the Hartford Division of the Connecticut Company to succeed the late Warren P. Bristol. Mr. Scott has been employed by the company in Hartford and vicinity for twenty-five years and for some time has been filling the position of assistant manager. In the appointment of Mr. Scott to this position is recognized the choice of an ex-



N. J. SCOTT

ecutive trained for the responsibility in the school of practical experience and first-hand contact with the problems of trolley management.

In the Connecticut Company's announcement of the appointment of Mr. Scott, it is indicated that the powers of local managers have been broadened, as was suggested recently in a special report to the Connecticut Public Utilities Commission. It says:

The managers of the various divisions of the Connecticut Company are charged with sole responsibility for the operation of their respective divisions, and are responsible for all matters pertaining to the service and upkeep of the property. They are expected to keep fully posted as to the particular needs of the various committees, and to see that in all matters the convenience of the public is assured. They have full authority to initiate such charges as in their opinion are best suited to meet the requirements of the communities which they serve.

Mr. Scott was born forty-four years ago in the Province of Quebec, Canada. His early education was acquired there and he was graduated from the Knowlton High School. Coming to Hartford shortly thereafter, he entered the employ of the Connecticut Company in July, 1896, and has been with it continuously since. He began as a conductor and spent some five years as a platform man. Later he became carhouse foreman and was successively made dis-

patcher and chief clerk to the manager, rising from that place to superintendent of transportation in which capacity he served for many years until his promotion came to the position of manager.

During this period of service Mr. Scott acquired a wealth of detailed knowledge of street railway conditions, particularly as they pertain to Hartford. His familiarity with the local problems of the company's system contributes in large measure to the qualifications which earned his promotion. He is held in high esteem by all his colleagues, and his long association with the Hartford office has contributed to the best of friendly relationships.

Pioneer Railroad Builder Retires

William Hood, chief engineer of the Southern Pacific Company and one of the greatest railroad engineers in the United States, retired on May 3, according to an official announcement made by President William Sproule of the Southern Pacific. George W. Doschke, formerly assistant chief engineer, has succeeded to the position. Mr. Hood left on the fifty-fourth anniversary of his first connection with the company.

Mr. Hood left the employ of the Southern Pacific Company at the age of seventy-five years, not because of failing health or because of his age, but because he desires to attack more difficult problems than are presented by the railroads in this stage of operation when no large extensions of roads are contemplated. He prefers to labor with the difficulties of new construction and development with its attendant out-of-door activities.

Ever since he went to work for the Central Pacific in 1867, Mr. Hood has been closely identified with the work of uniting the West by steel rails. In the development of the railway system with which he has been connected he has been called upon to solve the most difficult engineering problems, and some of the feats which he has accomplished will prove lasting memorials to his ability.

Mr. Hood was born in Concord, N. H., in 1846. As he was preparing for college at the age of sixteen the Civil War broke out, in which he saw service in some of the most sanguinary conflicts of the struggle. After being mustered out of service he entered Dartmouth College where he remained until 1867. Inspired by the efforts to construct a railroad through the Rockies he left college and came to Sacramento where he obtained employment with the Central Pacific. He soon became assistant engineer and in 1875 was made chief assistant engineer.

Mr. Hood has been chief engineer

of the Southern Pacific since 1885. He is intimately acquainted with every portion of the system which operates over more than 11,000 miles, having traveled on foot across almost every mile of the territory later spanned by the present tracks.

Mr. Hood has saved his company a vast amount of money in construction costs by exercising true engineering skill and evolving many clever expedients to solve knotty problems.

E. F. Eicks, Auditor of Fort Wayne-Lima Line

Edward F. Eicks, who some time ago was appointed auditor of the Fort Wayne, Van Wert & Lima Traction Company, Fort Wayne, Ind., has taken charge of the accounting work of that system. His duties are separate from those of L. W. Van Bibber, auditor of



E. F. EICKS

the Ohio Electric Railway system, which holds and operates the former property.

B. H. Jones is receiver of the Ohio Electric Railway system proper, while some of the other subsidiary companies have been placed under separate receivers. Such is the case of the Fort Wayne, Van Wert & Lima Traction Company, of which H. C. Paul is the receiver. It was his intention, under the general plan of receivership for the whole system, to segregate the accounts of the Fort Wayne line for operating purposes. New offices have been established at Ewing and Pearl Streets, Fort Wayne, in the building owned by the Indiana Public Service Corporation. Mr. Eicks has been placed in charge of these offices.

The receivership of the Ohio interurban system, one of the largest in the world, with its 467 miles of interurban lines and 33 miles of city lines, came several months ago as the result of a succession of unpreventable and unfortunate occurrences. The combination of high war-time costs, preceded by a tremendous property loss by flood in 1919 and followed by an ever-increasing loss of traffic from automobile competition, has precluded the possibility of meeting operating costs alone, to say

nothing of allowing a return to its investors.

The latest report, under the separate management, of the interurban connecting Fort Wayne and Lima, shows an operating surplus of about \$600 for the period from Jan. 26 to Feb. 28, 1921. The statement also indicates that substantial gains in earnings are being made by the other properties included in the Ohio Electric Railway receiver-ship.

Practically all Mr. Eicks' training and experience have been along the line of cost finding and accounting, though more in connection with commercial affairs than with railways or utilities. He has handled this sort of work for branch houses of various firms for the past several years. Previous to his present appointment he was accountant for the Sherman-White Company, wholesale dealers in poultry products and owners of a large cold storage house. Mr. Eicks was a lieutenant in the 33rd Division during the war.

J. A. MacAdams has accepted the position of general manager of the Claremont (N. H.) Railway, succeeding A. C. Ralph, deceased.

J. R. Tozer, for four years power engineer of the Rutland Railway, Light & Power Company, Rutland, Vt., has resigned to accept the managership of the municipal plant at Swanton, Vt.

L. Edward Herrmann, Jersey City, general counsel for the New Jersey Board of Public Utility Commissioners, and Alfred N. Barber, secretary of the body, have been reappointed to their respective positions.

William B. Malone, the general manager for the past year of the Meridian Light & Railway Company, has left Meridian for Salina, Kan., where he will be the general manager of the Salina Light, Power & Gas Company. Mr. Malone has been succeeded as general manager by H. C. Bonner, formerly general manager of the Alliance Gas & Power Company, Alliance, Ohio.

W. O. Clure, general passenger agent for the Twin City Lines, Minneapolis, Minn., returned to his office on May 16 after an absence of several months, the result of injuries from a fall into the company's headquarters building passenger elevator shaft. The accident occurred on Labor Day. Mr. Clure has been making occasional visits to the offices for some time with the aid of crutches.

W. H. Coleman, of the Montgomery Light & Traction Company, Montgomery, Ala., succeeded on April 1 E. W. Ashmead as manager of the street car lines of the Alabama Power Company in Gadsden, Ala. Mr. Ashmead has been promoted to the commercial department of the Alabama Power Company at Birmingham. Mr. Coleman is a practical street railway man, having served mostly in the operating department of the system in Montgomery, where he has had long and varied experience in the business.

Mr. Feiker in Washington

Hoover Selects McGraw-Hill Executive as Assistant to Develop Aids to Business

F. M. Feiker, vice-president of the McGraw-Hill Company and chairman of that company's editorial board, has been appointed assistant to the Secretary of Commerce. An indefinite leave of absence from the McGraw-Hill Company has been granted to Mr. Feiker, so that in accepting the appointment he will lose only temporarily his active connection as an official of the company.

Briefly Mr. Hoover has divided the bureaus of the Department of Commerce into two parts. Assistant Secretary Huston will supervise the bureaus relating to navigation and fisheries, while Mr. Hoover will give his personal attention to the Bureaus of Foreign and Domestic Commerce, Standards and



F. M. FEIKER

Census. Mr. Feiker will directly assist Mr. Hoover in the expansion of these bureaus as aids to business.

The immediate problem is to find out by means of a series of conferences with the representative men of industry what kind of facts and figures industry needs from the Government. Having organized the department to function according to requirements, the next problem is to devise an adequate system of clearing the collected data back to business. It will be apparent at once that with Mr. Feiker's background of engineering training, viewpoint on the needs of industry and sense of publicity, he will be in a position to render unusual service in the furtherance of Mr. Hoover's plans. It is Mr. Hoover's purpose to develop the Department of Commerce so that it will have the same relation to business that the Department of Agriculture now has to farming. In other words, he feels that its function is to aid industry, not to regulate or control it. Considering his intimate knowledge of foreign conditions,

his masterful grasp of economic principles, and his present official position, important results should follow.

Mr. Feiker, an electrical engineer by profession, has been especially interested in aiding Mr. Hoover in the development of his plan for the elimination of waste in industry which was undertaken by the Federated American Engineering Societies at Mr. Hoover's suggestion. Mr. Feiker is a graduate of the Worcester Polytechnic Institute, class of 1904, and for several years was chairman of the editorial board of the A. W. Shaw publications of Chicago. In 1915 he succeeded Dr. A. S. McAllister as editor of *Electrical World* and in 1919 he was appointed editorial director of all the McGraw-Hill publications. Mr. Feiker has served on a number of important committees of the National Electric Light Association and in 1920 was president of the Editorial Conference of the New York Business Publishers' Association.

John E. Zimmerman, Day & Zimmerman, Philadelphia, Pa., has been elected president of the Washington-Virginia Railway, to succeed the late Howard S. Graham. Thomas Roosevelt, also of Day & Zimmerman, has been elected vice-president, succeeding R. Golden Donaldson, who resigned, but will remain as a director and member of the executive committee.

Francis H. Miller, vice-president and superintendent of maintenance of the Louisville (Ky.) Railway, was elected president of the Louisville Rotary Club at the annual meeting of the newly elected board of directors of the organization. Mr. Miller was elected from the board of directors, which elects the president and vice-president, while the other officers are elected by the general membership.

Paul A. Lazenby, who was recently elected engineer of the newly-organized Toronto Transportation Commission, gained considerable of his experience in transportation work in the United States. He is a graduate of the civil engineering course at Massachusetts Institute of Technology in the class of 1904. Mr. Lazenby spent four years in general engineering and construction work with the Chicago, Burlington & Quincy Railroad, Deadwood, S. D. After considerable experience with other roads, in 1911 he accepted a position as associate engineer with the Chicago Plan Commission and was engaged in the preparation of a city plan and in transportation studies for that commission until 1915, when he resigned to become principal assistant engineer for the Civic Transportation Committee, Toronto, which was the forerunner of the present Transportation Commission. While with the Chicago commission Mr. Lazenby assisted in the engineering work in connection with the new Pennsylvania terminal on the west side of the city. He was also associate engineer in the preparation of city plans for Brooklyn, Minneapolis and Detroit.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Easy Deliveries Feature Rope and Cord Market

Operating Companies Not Accumulating Stocks and Buying Has Not Increased—Raw Cotton Quoted Higher

A 10 per cent decrease in the prices of trolley rope and bell cord made last month with a view toward stimulating sales has so far had little effect on the market. Operating companies are not accumulating any large stocks of this material under present conditions of prompt delivery, and until present stocks are lowered considerably it seems unlikely that buying will set in on any accelerated scale. Leading manufacturers in the east report both inquiries and sales as below normal, showing practically no change from the recent small volume of transactions. Collections are slow on sales actually made, but that is not unexpected under existing world trade conditions. Spot cotton in New York shows a slight advance to 13.05 cents since last report.

Some divergence exists among manufacturers in the matter of factory stocks and deliveries. Under present conditions of restricted buying and slow payments some refuse to maintain stocks at their plants, agreeing to make as prompt deliveries as possible on orders received. Others report fairly plentiful stocks and immediate shipments on orders. Factories are operating below their capacity, although one establishment is running about six days a week, turning out electric railway and other material.

Prompt Shipments of Safety Tread Material

Some Manufacturers Report Very Little Railroad Buying, but Others Find Demand Is Increasing Satisfactorily

Uneven conditions as regards buying are reported in the market for safety floor and step treads by manufacturers. On the one hand it is reported that very few orders are being received from either steam or electric railways just now. Some manufacturers, however, state that though sales are still below normal, they are increasing satisfactorily, and at least one producer is finding the railway market for safety tread material more active at present than at any time in the past. Large orders have been received from the Pacific Coast, it is stated, and inquiries indicating a future demand are coming from the Middle West, but the market in the East remains quiet.

Raw material stocks are reported to

be large, some manufacturers carrying a heavier stock at present than at any previous period. Consequently, though it is a general policy not to stock the finished product, inasmuch as each order is made to specification, orders can be filled very quickly. In general factories are able to make up material in from one to two weeks' time. Production is naturally curtailed under present market conditions, operation as low as 50 per cent of capacity being reported.

Where labor readjustments have been made in this field, prices have been reduced about 15 per cent from the peak, but in instances where war-time wages are still maintained the slightly lower

price of raw material has not yet afforded sufficient margin to warrant reducing prices. Labor cost, it is stated, is a large element in the manufacture of safety tread material, and, furthermore, the large stocks of raw material that are on hand may very possibly be a factor in the price situation.

The railroad business in this market is of course by no means the most important sales outlet, the general outlook for business depending largely upon the building construction industry. Mail inquiries and reports received from field agents, however, are said to indicate a volume of demand later on that will absorb full capacity production.

Railway Motor Production at About Thirty per Cent Capacity

Stock Delivery of Safety Car Type—Car Builders Working Off Last Year's Supply—Present Market Far Below Normal, but Producers Remain Optimistic

Sales of railway motors show considerable falling off this spring compared with last year, producers report. Buying of this class of material has been sub-normal for several years past but the present market seems especially below par. An estimate that demand this year is running about 50 per cent below normal and about 25 per cent below last year has been regarded as conservative to say the least.

Once the war had an opportunity to exert its influence in the raising of prices, sales of railway motors fell off badly. Increased cost of operation and decreased earning power of the railways kept purchases down although the advent of the safety car afforded some relief. This was reflected in sales last year which for one of the large producers increased to about three-fourths of the average yearly total of motors billed during the four-year period previous to the war. More than half of the year's bookings in this instance were made during the first three months of last year, and in comparison with this the first quarter of 1921 saw only one-seventh the same number of motors sold. Furthermore, whereas in the first quarter of 1920 nearly half the motors sold were for safety cars, in the same period this year only about 5 per cent of the total were of this type.

This would seem to indicate a decided slump in the safety car demand, but other information received is to the effect that sales of safety car equipments are still exceeding those of larger types. The reason for the apparent slump in safety car motor sales noted above is probably because vir-

tually all car builders stocked up heavily in 1920 and are still trying to work off stocks of motors which were left on their hands. Motor manufacturers were forced to carry considerable stocks of safety car motors over into this year too, because at this time a year ago factories were running behind and production was increased accordingly. Production is now down to a level commensurate with the market and ranges from 25 per cent of capacity to 30 or 40 per cent.

Stock shipments of safety car motors are being made and reasonable shipments on those of larger capacity. Standard 40, 50 and 65-hp. sizes would probably range about 60 days. Stocks are being reduced and inasmuch as it seems to be the intention not to increase production before the last quarter, it is quite probable that all motor stocks will be considerably depleted within the next few months. Prices have come down from the peak, of course, the reduction in a representative instance amounting to 10 per cent during the past few weeks. Unless there are further decreases in labor and material cost no further price reductions are foreseen, especially while the necessarily curtailed production entails a high overhead.

The outlook for business, producers report, while not good in the immediate future, is such as to induce an optimistic view of the situation. Notwithstanding business depression, it is stated, the market looks promising due to labor reductions and increased revenue over last year on electric railways, and an easier money market. Almost

every line in the country badly needs equipment and the view is expressed that railways can not hold off purchasing much longer. Consequently, a slow but gradual increase in business each month is expected.

Rush Orders Feeling Pinch of Deliveries

Policy of Manufacturers in Not Stocking Delays Delivery of Material Needed in Detroit

In connection with the tremendous construction program which is under way in Detroit, Mich., where the city is building an extensive municipal railway system, it has been found difficult to obtain shipments of material promptly enough to meet requirements. On the surface this appears to be a unique situation under prevailing conditions of light buying and prompt railroad deliveries, but it may possibly be a more general condition than is imagined. Reasonably good deliveries can be secured on orders placed normally for future use, it is stated, but where anything is wanted in a hurry it is almost impossible to secure it. As is always the case in any large construction program, there is frequently need for various equipment and material on short notice. Almost without exception, the municipal railway officials report, it has been impossible to find any manufacturer with a stock of the thing wanted on hand.

This is quite evidently an outcome of the declining price situation, for with inventories constantly diminishing, manufacturers are keeping their stocks just as low as possible to avoid loss. The purchaser at this time is then confronted with the necessity to await the manufacture of anything he wants. This is also a reflection of the refusal of railway companies to buy beyond their immediate and pressing requirements, in the expectation that prices will decline. Hence, if railway companies are unwilling to take any chance on a diminishing inventory of stocks on hand in their own storerooms, can they be surprised that the manufacturers should refuse to carry stocks and run this risk in order to meet hurry-up orders of their consumers?

Refractories Lower in Price

Output Greatly Reduced with Demand, but Stocks Are Good at the Mills

Recent price reductions in the refractory market brought Pennsylvania fire-clay brick down \$2 per 1,000, while in the middle of April magnesite brick was reduced \$10 per net ton in standard sizes, silica brick came down \$5 per ton, \$5 per net ton was applied to chrome brick and from \$2 to \$5 to fire-clay brick.

The demand for refractories is at a low ebb. Production, consequently, is in the neighborhood of 25 per cent, some of the larger producers working at a slightly higher rate, while among

the smaller producers some shutdowns have been reported. Stocks, however, are in sufficient quantity to last over three or four weeks of normal demand, but at the same time steel mills still have some materials on hand. The steel and glass trades provide the strongest market for refractories, but these two industries are operating at about 40 per cent and 25 per cent rates respectively at present. Fire brick for power boilers provide not only a construction market but also a repair and maintenance market.

Easier Prices Noted on Some Miscellaneous Supplies

With rubber-covered wire selling from jobbers' stocks at prices ranging from \$6.75 and \$6.50 to around \$7.50 per 1,000 ft. in 10,000-ft. lots, depending on the part of the country concerned, it might be expected that other wiring materials could be picked up at considerably lower prices than was the case a couple of months ago. Flexible armored conductor is on a \$55 Pittsburgh base price but some jobbers are selling it for this amount in 1,000-ft. lots. Connectors for this conductor were just lowered 12 to 22 per cent.

Some renewable fuse manufacturers just dropped their prices about 17 per cent and at least one maker of fuse wire and fuse links has taken 20 per cent off his prices. From other quarters comes word of a 10 to 17 per cent drop in price of steel switch boxes and in floor boxes.

Westinghouse's Annual Report Shows Favorable Balance

Billings of the Westinghouse Electric & Manufacturing Company for the fiscal year ended March 31, 1921, from the company's annual report just issued, amounted to \$150,980,106.39. The net manufacturing profit on the year's business was \$12,206,021, even after taking out \$5,315,196 for depreciation and adjustment of inventories. An appropriation for a special contingent reserve of \$5,000,000 has also been made from surplus to provide for further possible shrinkages and adjustments in the inventories. Total surplus on March 31, 1921, amounted to \$56,053,299 after adding a net income for the year of \$12,617,535.

Property and plant account shows an increase over the previous year of \$9,361,403 and embraces construction completed during the year. An important extension was made to the works at Lester, Pa., where the manufacture of steam turbines, condensers and marine propulsion apparatus is now concentrated, making available additional manufacturing space at East Pittsburgh for electrical apparatus. An additional lamp factory was erected during the year at Indianapolis, Ind., and extensions were made to the plants at Milwaukee, Bloomfield, Bridgeport, Mansfield and East Springfield, Mass. Developments and investments were

made in the wireless field and other high-frequency current fields.

Accounts receivable amounted to \$34,551,599, while inventories embrace \$80,724,389. Total capital stock is \$74,812,650.

Electric Railways Place Large Rail Orders

That there is some activity in the field of track construction work this spring, despite general dullness in the business situation, is evidenced by two sizable orders for rails and kindred material recently placed by electric railways. The city of Detroit, Mich., Department of Street Railways has placed an order for rails divided into lots of 900, 200 and 100 tons of different sizes, totaling about \$80,000; 10,000 tons of another type of rail at a cost of nearly \$600,000; special track-work totaling about \$100,000, and double-track specials amounting to nearly \$25,000, or a grand total of almost \$800,000.

The United Railways of St. Louis has placed an order for 5,000 tons of rails for the reconstruction of 32 miles of track during this year. Spikes, bolts and tie plates are also being ordered. The track construction is to cost about \$1,485,000.

Rolling Stock

British Columbia Electric Railway Company, Ltd., Vancouver, B. C., Canada, will change over all its passenger cars with the exception of seventy-one interurbans, to conform to the new rule of the road which is being changed from left to right on or about Dec. 1. The interurban cars are standard but the platforms of the company's 319 city passenger cars will have to be reconstructed. The problem is increased by the fact that out of 231 cars operated in Vancouver, only forty-four are double-end. At least six months will be required to fit up the company's shops for taking care of this work.

Track and Roadway

British Columbia Electric Railway, Vancouver, Can.—Arrangements have been practically completed for changing the rule of the road from left to right in the lower portion of British Columbia on or about Dec. 1 next. Delay was occasioned until the government and the British Columbia Electric Railway could agree to terms on the defraying of the cost of changing the railway system. The government will pay \$350,000 toward the cost which is estimated to be \$800,000 for the change alone while the company will make other expenditures not essential to the change, bringing the total sum up to about \$1,000,000. The change will probably take place in Vancouver and on the rest of the mainland system and later in Victoria, which is on Vancouver

Island. The changing of cross-overs, electric switches and points in the track is involved. On interurban lines changes will be necessary in cross-overs and stations.

Sterling, Dixon & Eastern Electric Railway, Sterling, Ill.—The Sterling, Dixon & Eastern Electric Railway plans to reconstruct its car lines in Sterling, at an estimated cost of \$35,000.

Boston (Mass.) Elevated Railway.—The Boston Elevated Railway has recently placed an order for signal material which will be required for the installation of 68 automatic blocks in double-track sections on the main line in the Charlestown and Roxbury districts. The signals will be the style N, three-indication color-light type and of the same design as installed by the Boston Elevated at Sullivan Square interlocking and on the Everett extension in 1917. Model 15, two-element vane-type track relays will be used throughout. Electro-pneumatic automatic stops will be installed at each automatic signal. A new interlocking is to be installed at Tower D in connection with these improvements. This will be of the A. C. electro-pneumatic type governed by a seven-lever Model 14 power interlocking machine, controlling in addition to the switches, two 2-arm high and three dwarf signals, all of the style N color-light type. Extensive changes are also to be made at the large Tower C interlocking at North Station. These changes involve the installation of 14 two-arm and 10 one-arm style N color-light signals, as well as 15 automatic train stop layouts and 26 A. C. track circuits for the semi-automatic control of signals, detector locks and sectional route locking. All the track circuits will be operated with Model 15 two-element vane type track relays and the same type of instrument will be used for the line circuits. All materials are being furnished by the Union Switch & Signal Company, Swissvale, Pa.

Dallas (Tex.) Railway.—Service has been put into effect on the Lake Avenue extension out Fairmount Avenue to the City Hospital by the Dallas Railway. This is one of the extensions to which the traction company was committed under the terms of the franchise granted the Strickland-Hobson interests in 1917.

Tulsa (Okla.) Street Railway.—The Tulsa Street Railway Co. announces that it will soon begin the work of double-tracking its South Main Street line. Plans are also being prepared for double tracks on other lines and other extensions.

Power Houses, Shops and Buildings

Knoxville Railway & Light Company, Knoxville, Tenn.—The Knoxville Railway & Light Company will install a new substation at Washington and Sixth Avenues.

Professional Note

Parsons, Klapp, Brinckerhoff & Douglas, engineers, announce the removal of their Cleveland, Ohio, office to 743 Hanna Building.

The George H. Gibson Company, New York City, consulting engineers, specializing in commercial research and advertising of technical products, announces the removal of its offices from the Tribune Building to the Hide and Leather Building, 100 Gold Street.

Trade Notes

The Monitor Controller Company, Baltimore, has established a Cleveland office at 420 Permanent Building, in charge of Robert Notvest.

The Lunkenheimer Company, Cincinnati, Ohio, announces the removal of its Chicago branch from 188 North Dearborn Street to 568 West Washington Boulevard.

The Arrow Electric Company, Hartford, Conn., announces that its New York sales office has been removed from 253 Broadway to the Borden Building, 350 Madison Avenue.

C. C. Bradford has been appointed assistant secretary of the Ohio Brass Company, Mansfield, Ohio. Mr. Bradford was at one time sales manager of the United States Light & Heat Company.

The Star Porcelain Company, Muirhead Avenue, Trenton, N. J., manufacturer of electrical porcelain products, contemplates the erection of an addition, 30 ft. x 100 ft., two stories, to its plant.

E. Gindre, president and general manager of Le Carbone of Paris, France, is in the United States for an extended period for the purpose of investigating the prospects in the carbon and carbon-brush business incidental to the possibility of expanding his service in the United States.

Triangle Conduit Company, Inc., Brooklyn, N. Y., on May 5 opened a factory at 1965 West Pershing Road, Chicago, for the manufacture of armored conductors, armored lamp cord and flexible steel conduit. Stocks of these materials will be carried here in addition to stocks of non-metallic flexible conduit, "tri-cord," etc., made in the Brooklyn factory.

Economy Electric Devices Company, Chicago, Ill., has received an order for sixty-eight power-saving railway meters from the American Railways Company, Philadelphia, for use on its Chester Division. These meters will be equipped with car inspection dials to announce intervals between inspections, according to the energy consumption.

The Black & Decker Manufacturing Company, Towson Heights, Baltimore, announces that it is now represented in Pittsburgh by D. C. Paul, formerly with the Gaul, Deer & Shearer Company, Philadelphia. The Pittsburgh office is

at 303 Penn Avenue, where there is also a completely equipped service station with a factory-trained service man in charge. This branch, of which Mr. Paul is manager, includes western New York, western Pennsylvania and the northern part of West Virginia.

John J. Swan has become associated with the Engineering Business Exchange, New York City, engaged in the purchase and sale of engineering and technical business properties. Mr. Swan graduated from Cornell in 1897. He was for a time one of the editors of *Engineering News* and has held engineering and executive positions with the Ingersoll-Rand Company, Chicago Pneumatic Tool Company, Longmead Iron Company, Keller Mfg. Company and others.

The Grindle Fuel Equipment Company, 1901 South Rockwell Street, Chicago, is offering, subject to prior sale, the unsold portion of \$500,000 in 7 per cent cumulative and participating preferred stock at a par value of \$50 a share, together with a bonus of one share of common stock. The proceeds of this sale will be used for additional working capital and for the construction and equipment of a new two-story factory building and a one-story foundry building. The plant will be used for manufacturing and demonstrating coal-handling machinery and equipment and coal-pulverizing equipment, in addition to gray-iron castings for the market.

New Advertising Literature

Fuses.—The Chase-Shawmut Company, Newburyport, Mass., has recently issued bulletin No. 201, describing and giving prices on the full line of material which it manufactures.

Controller.—Bulletin No. 44678A, just issued by the General Electric Company, superseding No. 44678, describes the company's various kinds of drum type controllers for railway service.

Jacks.—The Duff Manufacturing Company is distributing a new bulletin, No. 308, which illustrates and describes its line of automatic lowering jacks especially suitable for use in car repair shops, bridge work and for emergency service.

Engineering Catalog.—The seventh annual edition of "Sweet's Engineering Catalog" has been published by Sweet's Catalogue Service, Inc., New York City, listing in its 1,251 pages "materials, equipment and supplies relating to practical construction, equipment and maintenance of all projects of an industrial or engineering nature."

Tools, Etc.—Ingersoll-Rand Company, 11 Broadway, New York City, has just issued a large new loose-leaf catalog covering its entire line of various track tools, pumps, compressors, condensers, oil and steam engines, etc. A special section is devoted to engineering data covering problems which are frequently encountered in every-day compressed air practice.

"There is a PEACOCK Brake for every type of Car"

*For Double Truck Cars
Between 30,000 and 35,000
pounds and*

*Single Truck Cars
Over 26,000 pounds—*



"PEACOCK, $\frac{15}{49}$ "

Here is a Peacock Brake with a gear ratio of 15 to 49. On that type of car with a drop platform where the tendency of the brake chain is to draw upwards; the eccentric at the bottom of the draw allows the chain to take its natural course as it is drawn taut and secures the most direct pull on the brake rod when the tension on the brake is greatest.

There are also three places for attaching the chain to the eccentric. These afford a quick, easy method of adjusting the chain so that the eccentric will take up just the desired amount of slack.

On medium weight double truck cars this size of brake is giving unusually good results. Our Bulletin No. 5 will give you the details. If you do not have a copy write for one at once.

*Here it is—
note how the chain draws UP.*



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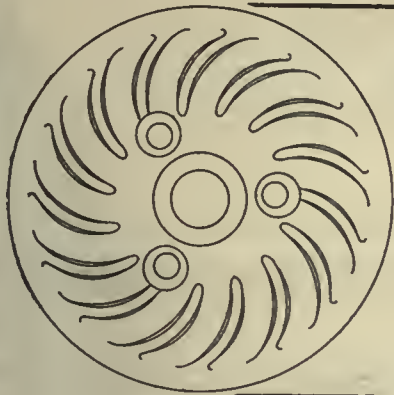
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The Babcock & Wilcox Co. is constantly endeavoring to improve the design, construction and operating qualities of its products. The Company believes in being conservative and in refraining from making changes until absolutely satisfied that its developments are sound from engineering, construction and operating viewpoints.

THE STIRLING BOILER

REDESIGNED, RECLASSIFIED, PATENTED

During the last fifteen years numerous changes have been made in the Stirling Boiler. In some instances these have been to meet special and unusual operating conditions, and others have been the result of improvements in details of design and construction. These changes have been carefully watched and proven under various and difficult conditions of operation. The advantages of many of them in service have been so marked that after years of experience and study these features have been incorporated in the redesigned Stirling Boiler.

The studies which have led to redesign have also led to a consideration of the variation between classes and sizes of Stirling Boilers. This has resulted in a reclassification of these boilers in which the variation between classes and sizes is simple, logical and progressive.

The redesigned and reclassified Stirling Boiler is now offered.

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*Our New Rattan
Pattern Upholstery*

HERE is a new type of Craftsman Fabrikoid which is sure to become very popular among railway men.

It is made in the color and embossed in the pattern of rattan so that it gives the cheerful, cleanly appearance of that material but at the same time retains the qualities which are inherent in Craftsman Fabrikoid upholstery.

It is scuff-proof, water-proof and stain-proof. It never looks "clothly" no matter how tightly it is stretched. Your upholsterers will find it especially easy to work and very economical, as it is uniform in quality and cuts with practically no waste.

Fabrikoid Rattan pattern upholstery has no open weave to catch and hold dirt. It may be washed with ordinary soap and water—therefore, it is always perfectly sanitary. Repeated washings do not change its appearance or flexibility.

Samples of rattan pattern Fabrikoid, as well as of other designs used for car upholstery, will be mailed upon request.

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*Looks like rattan—stain-proof, scuff-proof,
easily cleaned and comfortable. Costs much less.*

FABRIKOID

Five Million People Still Face Starvation

Think of it !

Before July 1st it is estimated that in China five million people may starve unless something is done — and done quickly.

The worst period of the gaunt famine that is stalking through China, and mowing down helpless men, women and children by the thousands, promises to come in May and June, just before new crops are harvested.

The pity of it !

China is seeking modern civilization. Soon she will become an industrial nation. For centuries, and still today, her people are farmers — and now their farms have failed thru draught. So China is extending her hands to the world, in mute appeal for help.

One Dollar a Month Saves a Life

What if these famishing millions *are* of another color? This is a great humanitarian service and an economic service, as well. The loss of five million or any large part of that number will be a serious economic blow to the World as a whole, which today needs human hands and minds. China has some of the best native brains in the World. Her people are patient and hard working. We can't sit idly by and do nothing, watching them die.

This famine relief has been dispensed very carefully by International Committees. Much, of necessity, has been given outright, since employment cannot suddenly be furnished to so vast a population trained in farming and suddenly forced to depend upon other types of work for which no industries had been developed. Railroads, highways, bridges and the like have furnished opportunities for people to do public service in return for relief given.

The friendship of China for America has been greatly increased by the help which America has already sent. Let us cement this friendship still firmer; it is in itself significant for future understanding around the Pacific.

Don't let this cry of distress beat upon deaf ears. Dig down. Do your part.

Send your contribution to Board of Foreign Missions, 150 Fifth Avenue, New York City



Buzzers



Resistance Unit



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Cross Seat Type Elec. Heater

**Consolidated Car Heating Company,
Specialties**



Brooklyn Center-Entrance cars are Equipped with
Consolidated Door Engines.

Safety and Comfort with Increased Speed

Safety and Comfort with Increased Speed is the net result of the operation of Consolidated Door Engines on Brooklyn's new center-entrance cars.

Consolidated Pneumatic Door Control speeds up cars during the rush hour resulting in more passengers and more revenue.

Consolidated Pneumatic Door Control closes the doors in a fraction of a second after the last passenger is on, thus saving heat in winter and keeping the passengers comfortable.

Consolidated Pneumatic Door Control relieves the conductor of much trouble and permits him to give more attention to collection of fares.

Let us show you some proof of what Consolidated Pneumatic Door Control already has accomplished.

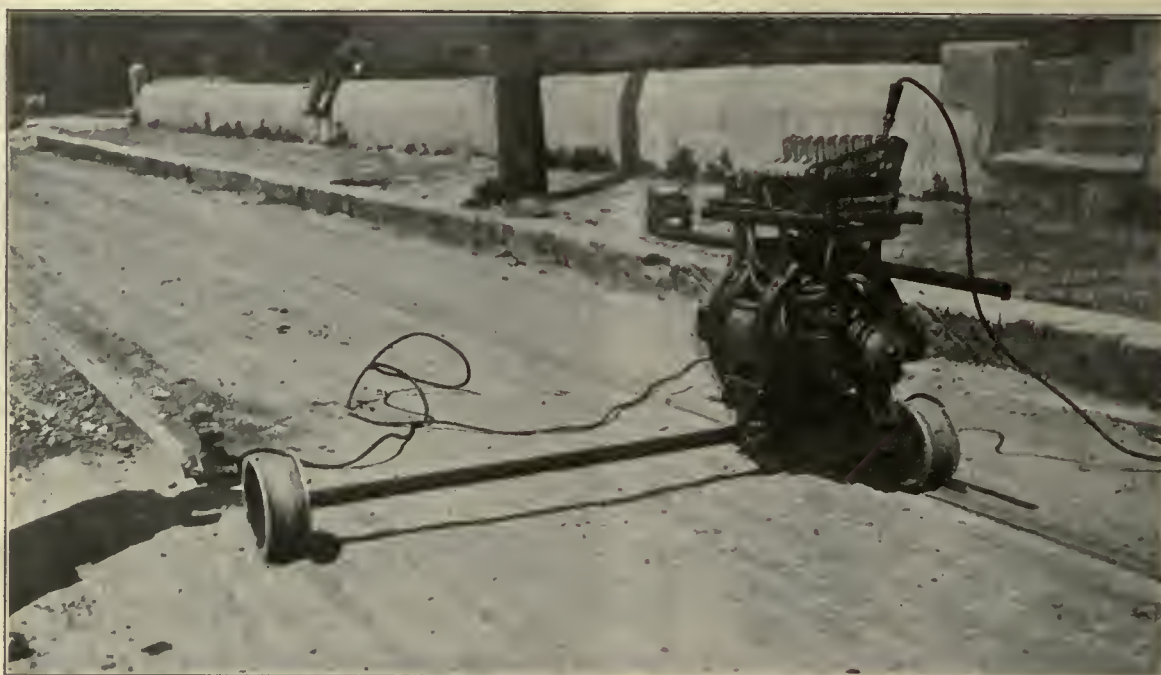
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The Portable RWB Dynamotor

Important Factors of Bonding

It makes no difference how expertly the bond itself is designed and manufactured. It cannot be a good bond unless correctly—perfectly—installed. The surest, simplest, most rapid and economical way to secure good bonding is to use Lincoln Bonds and to weld them with the RWB Dynamotor in approximately one minute, using the Carbon Arc.

Do you know that an RWB Dynamotor is not only used for bonding but for rail joint, track and shop welding? It pays for itself.

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No Need to Wreck the Baffle Just to Replace a Tube

1. Bent, blistered tube to be replaced.
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3. Defective tube removed; a quick, easy operation.
4. New tube inserted.
5. Space around new tube refilled with plastic; wall restored to original condition.

Turner Baffle Walls
Produced exclusively by The Engineer Company

Can be built tight whether the tubes are straight or bent. They permit easy withdrawal and replacement of any tube without the slightest injury to the wall.

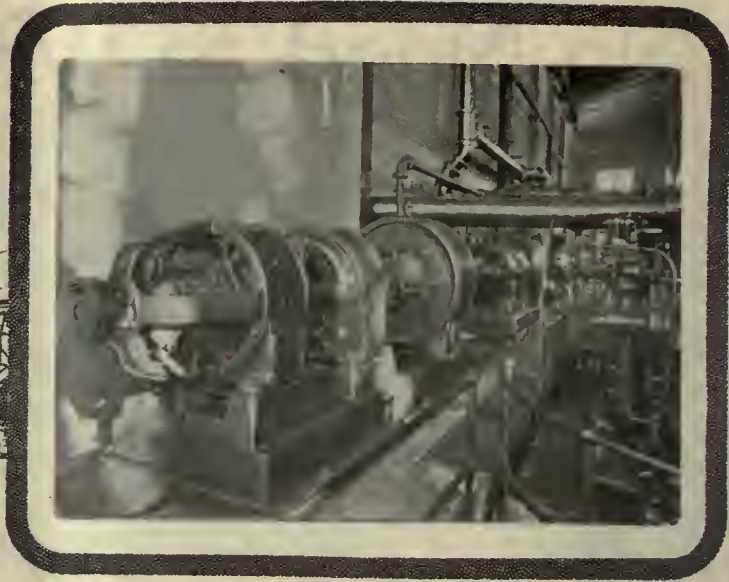
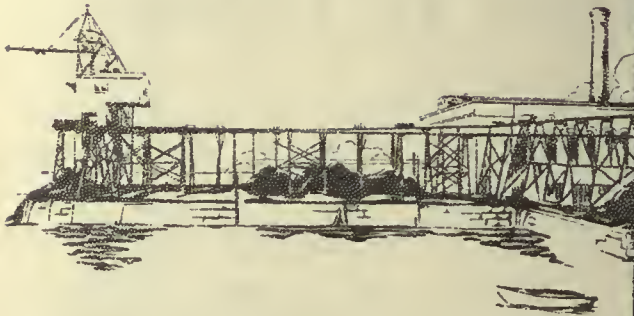
Yet this advantage, important as it is, is a minor one in comparison with other points of Turner Baffle Wall superiority. The fact that they can be built at any required angle has made possible the correction of almost every known boiler trouble.

"The Development of an Idea" sheds new light upon the value and importance of correct baffling; write for your copy.

The Engineer Co.
17 Battery Place, New York

Balanced Draft
Patented exclusively by The Engineer Company

ATLANTA Trust Co. of Georgia Bldg.	INDIANAPOLIS 310 Indiana Trust Bldg.	NEW ORLEANS 847 Baronne Street
BOSTON 10 High Street	MILWAUKEE 814 Security Bldg.	PHILADELPHIA 1010 Harrison Bldg.
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DETROIT 4610 Woodward Ave.		WILKES-BARRE 21 Bennett Building



First Class Excitation Service

THE Terry Duplex Exciter for many reasons has rightfully become one of the necessary power plant auxiliaries. It gives better plant efficiency by permitting improved heat balance. It insures main units against shutdown from loss of excitation because of its automatic standby features inherent in the design. Its first cost, maintenance and floor space requirements are smaller because it eliminates the necessity of separate motor driven and steam driven exciters, or motor drive with expensive storage batteries.

The Fall River Electric Light Co. have not lost a moment's excitation since the two 100 K.W. units shown in the illustration above were installed. They are furnishing excitation current for two 4,000 K.W. units and one 6,250 K.W. unit.

*Terry Duplex Exciters are furnished in sizes from 15 to 300 kw.
Bulletin S-261 contains all the information. Write for it.*

T-730

THE TERRY TURBINE

Offices in Principal Cities
in U.S.A. also in Important
Industrial Foreign Countries



The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.

Barph

The Rajput *barph* (father) binds around the arm of his son a string made of a few strands of sacred grass which is supposed to be a knockout as a protector against evil spirits.

It may work all right in India—

But fancy an American papa tying a few strands of timothy about the arm of his son before sending him into the wilds of Broadway!

Such an eloquent sign of the tall uncut would draw the Artful Jollyers as sugar draws flies and it is not improbable that the Favorite Son would be stripped as clean as a Greek statue by 1 A.M., after which some heartless "pony" from a Broadway musical revue would perhaps eat the hay off his arm just to make a clean job of it.

The use of common sense is the only way to keep out of trouble. This is especially true of brush trouble. To call in a Morganite engineer is to exercise common sense, because, the Morganite method is to determine first the kink in operating conditions which causes the trouble, then apply the type of brush which exactly *fits* those conditions.

Just as simple as it is sensible.



Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp., 13th and Wood
Sts., Philadelphia

Electrical Engineering & Mfg. Co.,
907-909 Penn Avenue, Pittsburgh

R. W. Lillie Corporation,
176 Federal Street, Boston, Mass.

W. R. Hendrey Co., Hoge Bldg., Seattle



Herzog Electric & Engineering Co., 150 Steuart
St., San Francisco

Charles Farnham, I. W. Hellman Bldg.,
Los Angeles

Railway & Power Engineering Corporation, Ltd.,
131 Eastern Ave., Toronto, Ontario, Canada

The ← 3" → Contact



**There's Safety
and Economy
in Its Unshake-
able Grip**

You don't need to be told the costly results of mishaps, from trolley wheels leaving the wire, tearing down overhead, damaging car roofs, delaying service and even injuring passengers.

The Miller Trolley Shoe

hugs the wire at a 60 mile clip—the 3-inch contact has no sensitive axis to bend or loosen. The Miller Trolley Shoe ends for all time the "chore" of constant lubrication.

Your motorman gets more power because of the greater contact surface. Your conductor is relieved from the constant necessities of replacing a "jumped-off" pole.

It's to your advantage to hear the rest of the story.

Write us.

Miller Trolley Shoe Co., West Newton, Mass.

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago

EASTERN REPRESENTATIVE: National Railway Appliance Co., New York

SALES REPRESENTATIVES:

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Engine Lubrication

AS we know you are interested in getting the most efficient engine oils and in decreasing your lubrication costs.

Texaco Engine Oils surpass all others when used—

For Drip Cup and hand feed,

For circulating oiling systems,

For circulating oiling systems with adverse water conditions,

For crankcase and splash oiling systems,

Special attention is given by The Texas Company in manufacturing engine oils that have the faculty of separating rapidly from water and other foreign matter.

These engine oils do not form emulsions and deposits.

All Texaco Products are uniform in quality and are shipped in clean and leak proof containers.

After you use Texaco Engine Oils for the power units under your care you will be thoroughly satisfied with the efficient results shown and freedom from lubrication troubles.

Texaco Engine Oils will give the same efficient results as have been established by Texaco Products used on the rolling stock equipment of electric street railways.

Our lubrication engineers are at your service and will cooperate with you in solving problems connected with the efficient lubrication of your power house. This service is gratis.

Texaco Engine Oils have been tested through years of service under all kinds of working conditions.



THE TEXAS COMPANY
DEPT. R-J 17 BATTERY PLACE • NEW YORK CITY
HOUSTON • CHICAGO • NEW YORK
OFFICES IN PRINCIPAL CITIES





G. E. Locomotive on C. M. & St. P.

*The Annual Convention of the
American
Railway Association*

MECHANICAL DIVISION

June 15 and 16

In connection with this event, as in previous years

ELECTRIC RAILWAY JOURNAL

will devote an issue primarily to the interests of the engineers and mechanical men identified with interurban electric railways and the electrified divisions of railroads. This "Heavy Traction" issue dated

JUNE 11

will have added circulation of great value. It will go not only to the 6000 men who buy 99% of all electric railway equipment, but in addition to every delegate who attends the convention and to the men on steam roads whose job it is to keep in touch with electrification progress for future development. This issue will reach 99% of the men who control the buying of everything bought for use in electric transportation — passenger, freight, express.

The Advertising Section

of this issue will form a buyer's reference medium for many months to come. Good copy prominently displayed in adequate space will bring business.

This issue starts printing JUNE 4

Copy suggestions prepared gratis by technical writers who know the buying habits of the Journal's readers.

ELECTRIC RAILWAY JOURNAL, Tenth Avenue at 36th Street, NEW YORK

Member Audit Bureau of Circulations. Members Associated Business Papers, Inc.

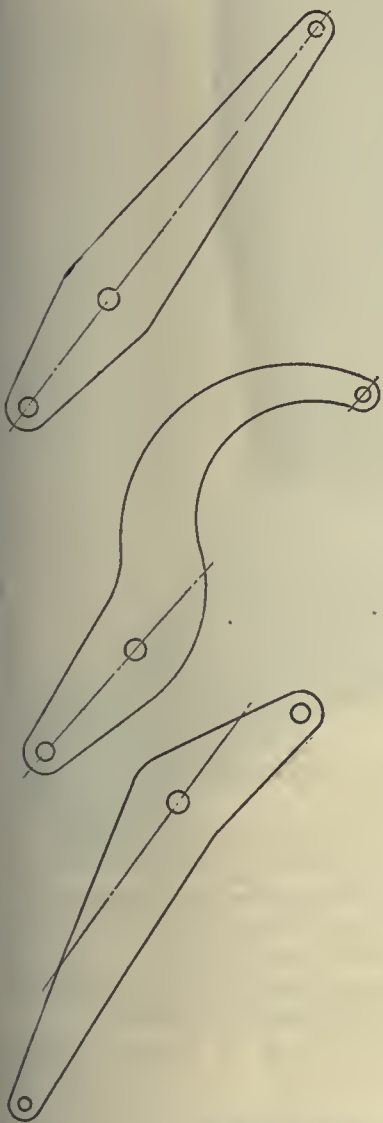
Boyerized Pins, Bushings and Brake Heads

Make any Shape of Lever Work Better

Of course, you're reading those mighty fine articles on brake rigging by H. M. P. Murphy beginning with the one in the Jan. 15 issue.

It's the kind of information we're glad to see published, for the more the importance of the brake rigging is appreciated the more appreciation we find for our originating and perfecting of specialties that enable the brake rigging to make good.

It doesn't make any difference what shape levers you have to use (see the kind taken from Mr. Murphy's first article) nor what braking force you have to apply. You will find invariably that Boyerized Brake Pins and Bushings and "Stag Brand" Manganese Brakeshoe Heads will give you that most desired combination of longest life, greatest safety and lowest cost.



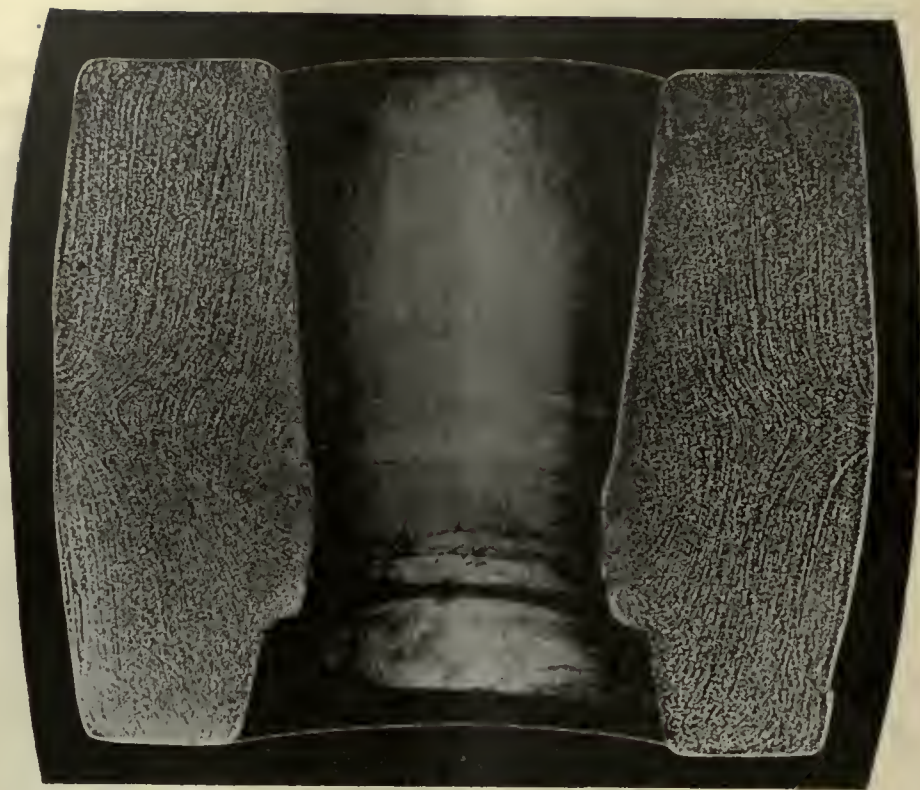
Straight Line
or Eccentric,
Boyerizing
improves both.

Boyerized Brake Hangers
Boyerized Brake Lever Pins and Bushings
Boyerized Wearing Plates between the
Bolster and Bolster Carrier
Boyerized Wearing Plates between the
Pedestal Straps and the Journal Box
Boyerized Pins and Bushings
for door fixtures

BEMIS CAR TRUCK COMPANY
Springfield, Mass.

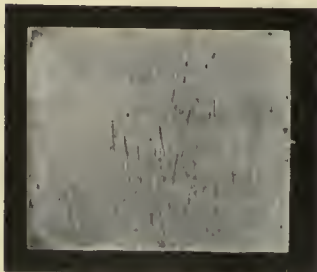
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D. L. Beaulieu, P. O. Box 3004, Boston, Mass. F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
 J. H. Denton, 1328 Broadway, New York City, N. Y. W. F. McKenney, 54 First Street, Portland, Oregon.
 A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



Grain Structure of Nuttall Drop Forged Pinion Blank

97.4%

Grain Structure of
Rolled Steel Bar-Pinion BlankGrain Structure of
Upset Forged Pinion Blank

The new Nuttall process of drop-forging motor pinion blanks produces a grain texture of great strength and ductility.

The transverse or crosswise ductility of this grain texture is 97.4% or less than 3% of being the same as the longitudinal or lengthwise ductility.

This uniformity is attained by specially working the steel, thereby producing an interwoven grain texture — without definite forging flow lines. Compare the illustration at the top with the two at the left.

This newly developed basic material, heat-treated by the Nuttall BP process, assures motor pinions unequalled for strength and wear.

Refer to our advertisement in the April 16 and 30 issues of *Electric Railway Journal*.

R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products

Nuttall

V_o

OILLESS TROLLEY WH

K

S TROLLEY WHEEL



The booklet "Trolley Wheels" contains a fund of vital facts on various types of More-Jones Trolley Wheels and Harps. Write today for a free copy.

Test These

Service performance is the real test of the efficiency of any piece of equipment. It has done more to place V-K Non-Arcing Harps and V-K Oilless Trolley Wheels first than any other thing, because never so much as today has it been so vital to keep maintenance costs at minimum. The V-K Non-Arcing Harp, reduces current waste and prevents all arcing due to loose fitting axle pins. The V-K patented gripping device locks the pin securely in its socket. Having an oilless bearing there is no insulation. This greatly improves current flow and lengthens life of wheel, harp and overhead.

More-Jones Brass & Metal Co.
St. Louis, Missouri

TROLLEY WHEELS:
V-K Oilless, M. J. Lubricated
HARPS: V-K Non-Arcing
BEARINGS: "Tiger"
Bronze
Axle and Armature
ARMATURE BABBITT
and Similar Products

MORE-JONES

“STANDARD”

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Gear Blanks

Steel Forgings

Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells

Steel Springs



*“The ‘Standard’ Brand on your material
is an assurance of eventual economy.”*



STANDARD STEEL WORKS CO.

GENERAL OFFICES

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MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

THE U-RE-LITE



A modern Circuit Breaker to meet modern conditions. An I-T-E Circuit Breaker in a steel box: so much better than a fused switch that it is in a class by itself.

It opens instantly on the occurrence of a short circuit or a predetermined overload and can be as instantly reset, but it cannot be closed if the overload continues on the line.

IT DOES AWAY WITH THE CONSTANT EXPENSE AND THE DAMNABLE ANNOYANCE DUE TO THE USE OF FUSES, FOR THE CRY "FUSE BLOWN" MEANS IDLE MEN. It greatly diminishes the possibility of fire from electrical causes and affords positive protection to employees as well as to light or power circuits.

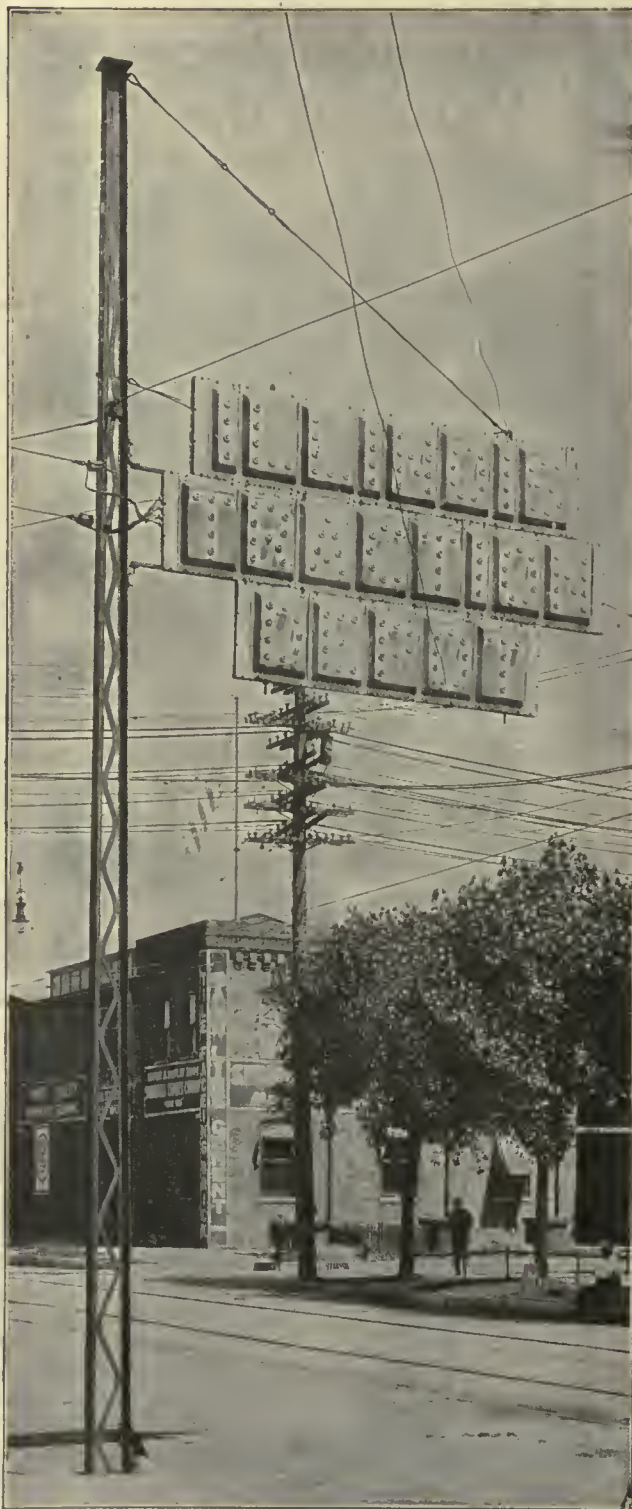
Made in capacities of 60 amperes and under for D.C. circuits of 250 volts or less and A.C. circuits of 250 volts or less, single phase.

Each pole is closed by a slight turn of the handle, which is seen projecting above and below the tripping knob, by means of which the U-RE-LITE may be opened manually.

*First to the left,
Then to the right,
Turn the handle
And U-RE-LITE.*

LITERATURE UPON REQUEST

The Cutter Company
PHILADELPHIA



Bates One-piece Poles Are Artistic

Perhaps Art is a secondary consideration when you plan your pole line construction, but it cannot be disregarded—especially when these poles are to be installed in exclusive residential districts or on your business blocks.

The combination of great utility and art with the lowest first cost makes the Bates Poles desirable for all types of pole line construction.

Our New 1921 TREATISE AND HANDBOOK sent upon request.

Bates Expanded Steel Truss Co. 208 South La Salle Street
CHICAGO, ILLINOIS

Consider the Value of the TIME SAVED by BAYONET Trolley Equipment



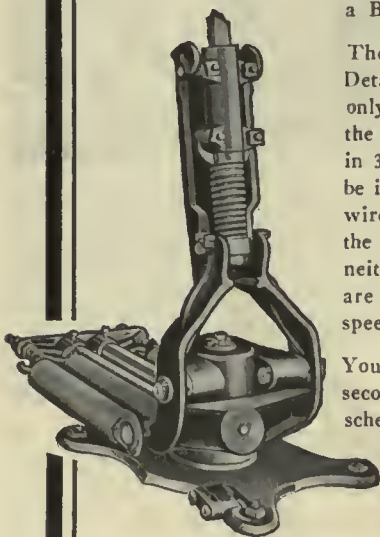
10
Seconds

are all the time required to change a Bayonet Trolley Harp or Wheel, or substitute a Bayonet Sleet Cutter.

The Bayonet Trolley Base with Detachable Pole Clamp is the only trolley base made on which the trolley pole can be changed in 30 SECONDS and the wheel be in perfect alignment with the wire, no tools required to do the job. And remember that neither safety nor durability are in any way sacrificed for speed.

You know how valuable those seconds are when headway and schedules are to be maintained.

Bayonet Equipment is sold subject to approval. It's the surest step you can take toward economy-plus-efficiency.



Bayonet Trolley Harp Co.
Springfield, Ohio

Cut Your Maintenance Costs By Using Triggerlock Reversible Controller Fingers

Over 50% of the large traction systems of America have used them exclusively for years.

Our sales of Renewal 'Tips last year were three times as much as in 1919.

By renewing the tips after both sides have been worn down the cost of complete fingers is saved.

This with the time and labor required to attach and adjust new fingers is great economy.

The motormen like them, as the controller is easier to operate.

We have Triggerlock Fingers for all types of controllers, trucks, tractors, starters, compensators, etc.

Specify them on your next requisition

G.E.K.-10
Showing
Tip unlocked



This is all you scrap when both sides of tip are worn out.

RUSSELL MFG. CO.

814-18 Bath Avenue, Niagara Falls, N. Y.

557 King Street, (West) Toronto, Canada

DOSSERT CONNECTORS



From the Giant Power Plant to the Little Safety Car

The picture on the left was taken in the Great Falls plant of the Montana Power Company. It shows Dossert Connectors used for making taps in bus bar compartments. This plant furnishes the power for the great C., M. & St. P. electrification.

The other photo shows a Dossert 3-way Connector

installed on a Safety Car of the Third Avenue Railway, New York.

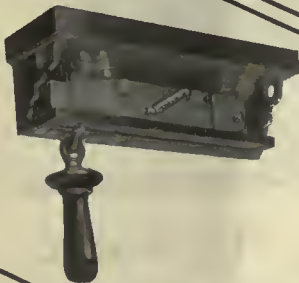
No matter what service, great or small, there is a Dossert Connector that will do the work more easily, more quickly and for less money—and will give better connections.

DOSSERT & COMPANY
242 West 41st Street, New York

NOW IS THE TIME TO CUT MAINTENANCE COSTS *As Never Before*



Lindall Brush Holder



Canopy Switch



Round Top Straight
Line Suspension

AETNA INSULATION

Line Material has been on the market 30 years. It is now as in the past the standard of the Electric Railway Field.

Albert & J. M. Anderson Mfg. Co.
(Established 1877)
289-293 A Street, Boston, Mass., U. S. A.

BRANCHES:

New York, 135 Broadway
Chicago, 105 So Dearborn Street
Philadelphia, 429 Real Estate Trust Bldg.
London, 191-192 Tottenham Court Road

Anderson Equipment will do
its share.

Eureka



Controller Fingers

are made of hard drawn or drop forged copper while the springs are stamped from special alloyed rolled phosphor bronze sheet. Fingers are interchangeable with all standard controllers.

Just two of a group
of specialties that
have set a standard
for Quality.



Trolley Wheels

are perfectly balanced, made of virgin metal and well finished. Correct design insures less wear on trolley wire and longer life of wheel.

Made by

The EUREKA CO.

North East, Penn.

120 Broadway, New York



Order By Name

See that "White" is on the end of every porcelain insulator you buy.

"White" reputation has encouraged substitution. You can't risk having a brittle, porous, unreliable insulator that has no mechanical or dielectric strength, worked off on you.

"White" quality goes with the name on the end.

Safeguard line interests by refusing any other "just as good" insulator.

T. C. WHITE ELECTRICAL SUPPLY CO.

1122 PINE STREET, ST. LOUIS, MO.

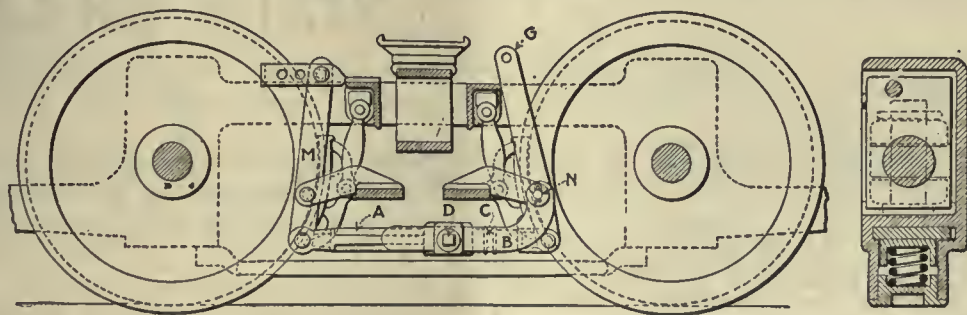
Still Climbing

Safety Car Sales are still climbing—
1700 in 1920 — 70% of all city cars—
and hundreds of them were Duality Safeties

Safety Car Prices are now lower—
Repeat orders are coming in— Duality
Safeties pay as they save — Start now —
send us your inquiry.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

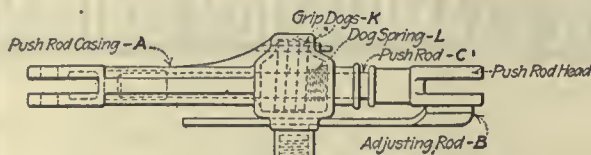
"More Mileage from Brake Shoes"



The Gould Universal Automatic Slack Adjuster keeps brakes effective by keeping them in adjustment

Brake shoes wear largely because they are so often out of adjustment. The Gould Universal Automatic Slack Adjuster is built to overcome this difficulty. It is absolutely automatic in action; it practically takes up all false slack which may exist in one operation coincident with the application of the brakes.

And, since it operates with every application of the brakes and is capable of making the most minute adjustments, the result of its use is that the brakes are kept adjusted at all



DETAILS OF THE GOULD TYPE SLACK ADJUSTER
AS APPLIED TO AN ELECTRIC CAR TRUCK

times and not simply for the first few days as after an ordinary hand adjustment. The results of keeping the brakes in perfect adjustment are, first and foremost, safety, more mileage from your brake shoes, then increased life of the entire brake system with decreased liability for break-ages in any part.

GOULD COUPLER COMPANY

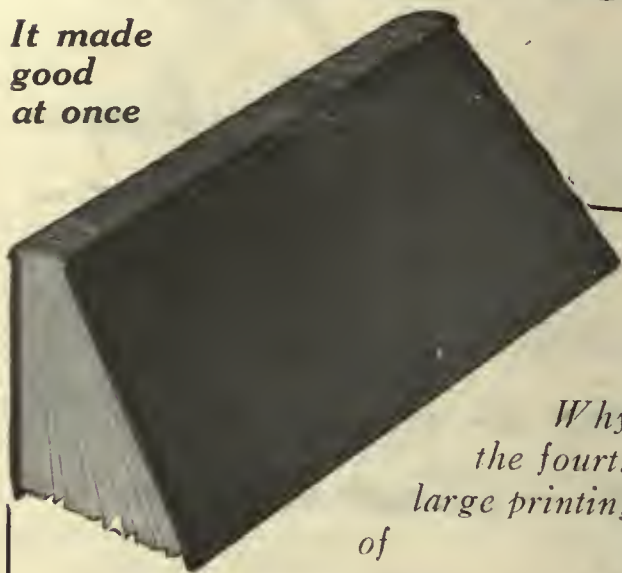
30 East 42nd St., New York City

Works: Depew, N. Y.

The Rookery, Chicago, Ill.

A practical book on armature winding

*It made
good
at once*



*Why
the fourth
large printing*

Armature Winding AND Motor Repair

By D. H. BRAYMER

500 pages, 6 x 9, illustrated, \$3.00 net, postpaid.

HAS SOLD SO STEADILY

This is a compilation of practical methods that are used by repairmen and armature winders—it is not a theoretical discussion of armature winding design. The book is made up entirely of common-sense data on actual armature winding and motor reconnecting. In selecting the material a special effort has been made to include as far as possible details of those methods which have been found by actual experience to represent best practice in a repair shop of average size.

When called upon to locate trouble in motors and generators, electricians and repairmen whose experience in this kind of work has been limited often find themselves wondering just what to do first. It is from just this viewpoint that the information on winding procedure and the hunting and correcting of troubles has been presented. That is, instead of discussing the fundamentals involved in any method of working out a repair problem, the actual problem or job as the case may be is discussed from the "how-to-do-it" standpoint. Then for each individual operation or procedure the applications of fundamental laws and rules are worked out.

See it for 10 days FREE

You must see the book to realize how useful it can be. We will send it for 10 days' FREE examination if you will fill out and mail the coupon. There is no obligation to purchase the book.

FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc.,
370 Seventh Avenue, New York, N. Y.

You may send me on 10 days' approval Braymer's Armature Winding and Motor Repair, \$3.00 net, postpaid. I agree to pay for the book or return it postpaid within 10 days of receipt.

Regular subscriber to the Electric Railway Journal?.....

Member of A. I. E. E.?.....

Signed

Address

Name of Company.....

Official Position

(Books sent on approval to retail customers in the U. S. and Canada only.) E 5-21-21



For Long Spans and Heavy Loads

In the railroad shop where heavy duty is paramount the right crane is essential.

NILES CRANES

For years have proven their ability to stand up under all conditions of service

Where the building construction is such that the standard design will not be practical we can design and build a crane to fit the job.

Accessible bearings are thoroughly oiled, thus reducing wear to a minimum and assuring long life. Cables are prevented from twisting, which eliminates undue strain and stresses.

All of these points and many more make possible the low maintenance cost of Niles Cranes.

*Standard size up to 250 Tons and Larger.
Variations in design to suit conditions
on consultation with our Engineers.*

Niles-Bement-Pond Co.
111 Broadway, New York

Allis-Chalmers Steam Turbines For Fuel Economy



12,500 K. W., 100 P. F., 1500 R. P. M. Allis-Chalmers Steam Turbine and Alternator Unit

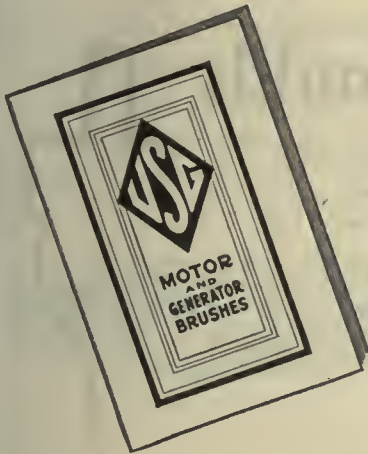
In the design of Allis-Chalmers Steam Turbines efficiency and reliability are the principal features receiving attention.

High efficiency under test conditions is an achievement to be proud of but real economy can be measured only by sustained efficiency over long periods of operation.

Allis-Chalmers Turbines are known above all others for sustained efficiency throughout years of constant operation.

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.



What do YOU *know* about MOTOR and GENERATOR BRUSHES

Write for our Brush Catalog No. B-2

*It is full of valuable information
to any electrical engineer.*

The United States Graphite Co.

Saginaw, Michigan, U. S. A.

Branch Offices: New York Chicago Philadelphia St. Louis Pittsburgh Denver Minneapolis San Francisco

LARGEST MINERS OF GRAPHITE ON THIS CONTINENT



Chillingworth One Piece Gear Case

40% Lighter and More Durable than Malleable Iron Cases



Chillingworth End Supported Gear Case

Weight 50 pounds for Safety Car Motor

CHILLINGWORTH MANUFACTURING CO.
JERSEY CITY, N. J.

Cold Drawn Deck Moulds

Deck mouldings for electric cars as well as any other part of the car must be substantial, rigid, light and artistic in appearance. It is essential that they hold these qualities in order that the cars be kept out of repair shops.

Since the adoption of Dahlstrom metal shapes for electric cars they have been found so desirable for this work their use has steadily increased.

Dahlstrom cold drawn shapes embody all of the above features. In addition they are usually shipped cut to length, mitred, drilled for screw holes and finish. When received by the builder, there is no time lost in preparing the shapes for assembling.

Our catalog illustrating our various cold drawn and pressed car shapes will be gladly sent free upon request.

Dahlstrom Metallic Door Company

431 BUFFALO STREET

JAMESTOWN, NEW YORK

New York Office
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Chicago Office
19 S. La Salle St.

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St. Louis
106 N. 3rd St.

No. 355

Representatives in All Principal Cities

No. 743



TRUCK WITH TOWER IN RUNNING POSITION

This 3-Section TRENTON TOWER

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.
Trenton, New Jersey, U. S. A.

Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company
PITTSBURGH, PA.



Electrical
Wires
and
Cables

JOHN A. ROEBLING'S SONS CO., Trenton, N. J.



Ask for "NATIONAL" Bulletin No. 14—

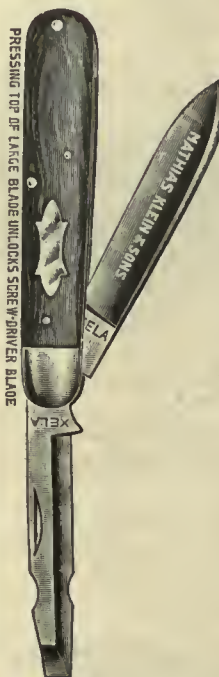
"NATIONAL" TUBULAR STEEL POLES

—free, on request, to electric traction engineers

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

USEFUL ELECTRICIANS' KNIFE



A handy combination for the electrician, combining an emergency screw driver, a knife blade for cutting or stripping wire; locked so that it cannot close during use. The commendable features are a well-tempered blade, a strong joint, a solid well-proportioned hand-fitting handle and a lock to keep the blade securely open, yet promptly releasable when it is desired to close the blades. Screw driver blade is locked when open; to unlock, press down on large blade.

Mathias Klein & Sons
Canal Station 25, Chicago

Transmission Line and Special Crossing Structures, Catenary Bridges

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Engineers and Contractors

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COPPER CLAD STEEL COMPANY

OFFICE AND WORKS.
RANKIN, PA. BRADDOCK P.O.

NEW YORK SALES OFFICE: 30 CHURCH STREET, NEW YORK CITY

COPPERWELD Wire—a non-corroding electrical conductor
8% Lighter—50% Stronger than Copper.



LUMBER

TIES—TIMBERS—POLES—PILING
DUNCAN LUMBER COMPANY, Portland, Oregon

Specialists
in
Street
Railway
Requirements
Write for List





TROLLEY POLES—

Massey hollow reinforced concrete trolley supports made by our centrifugal process are strong, permanent, neat and adaptable.

Eliminate maintenance by ordering poles that represent the most progressive development in this field. Massey poles never need painting or repairing—and are unaffected by weather conditions or vermin.

Facts and figures gladly furnished.

Massey Concrete Products Corporation
Peoples Gas Building, Chicago, Illinois

New York	Pittsburgh	Atlanta	Dallas
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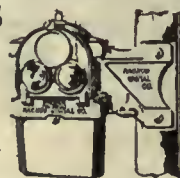
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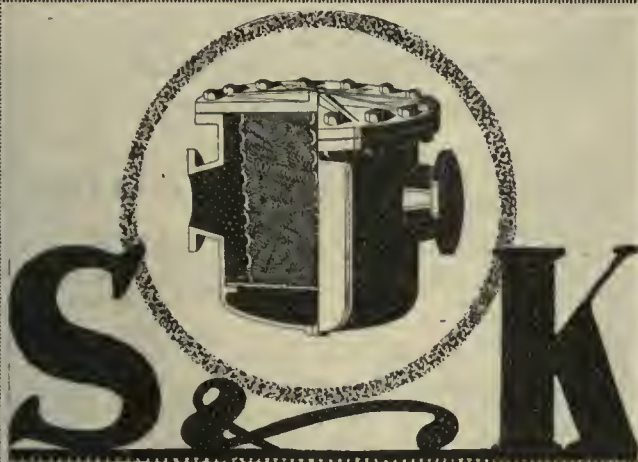
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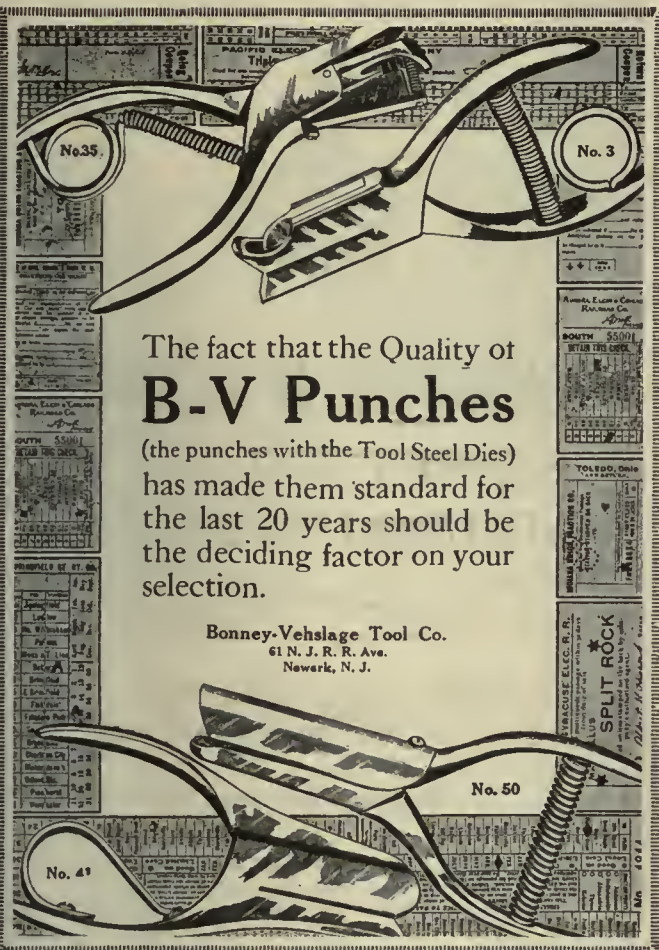
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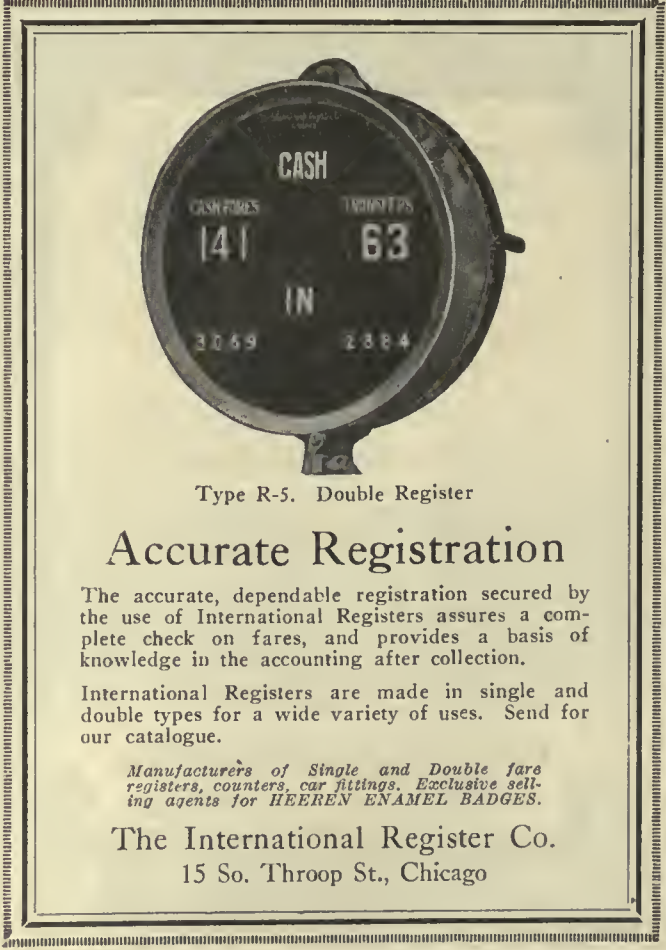


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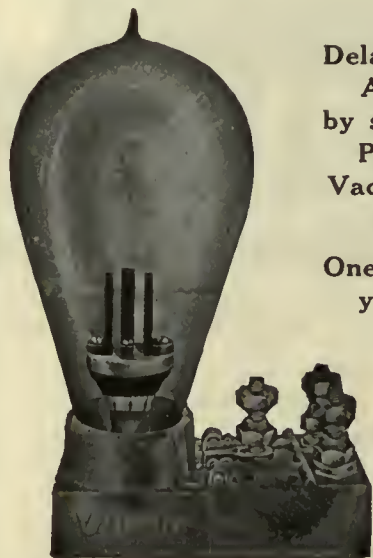
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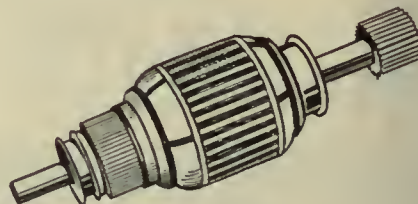
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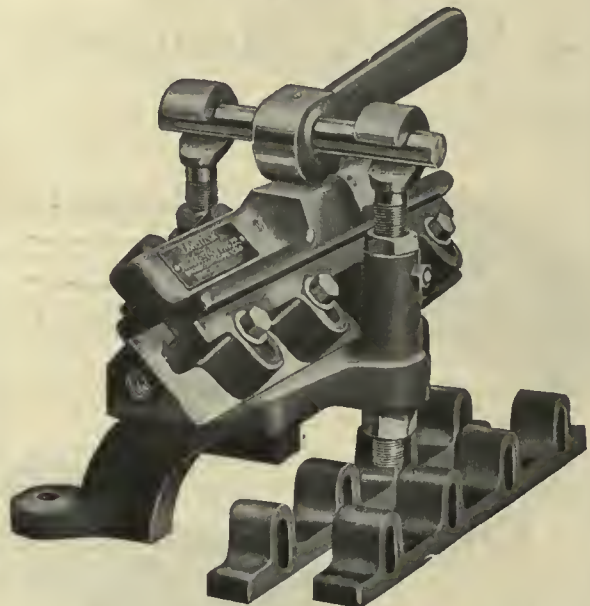


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Two Boilers, two Engines, two Generators, Belts, Feed Pumps, Heaters, etc. First-class condition. Ready for delivery about July 1. Full particulars on request.

1 Single Truck Motor Car
Fine condition. Complete, ready to use. A Bargain.

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Lock Haven, Pa.

For 20 Years
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Second-Hand Cars
Trucks and Motors

At Your Service

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30 lb., 40 lb., 50 lb., 56 lb., 60 lb.,
68 lb., 70 lb., 80 lb., 90 lb.

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NEW—80-LB. RAIL and ACCESSORIES A. R. A.
"TYPE B" RAIL
Approximately 30,000 gross tons—Standard Lengths—Stored at Kearney, N. J.

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We buy electric and steam railways that are to be dismantled



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Generator Sets, Dynamos
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ARCHER & BALDWIN, Inc.
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FOR SALE

Generating Unit

1—480-hp., 100-r.p.m., 150-lb.
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direct connected to 325 kw.
D.C. generator, 550-volt
Westinghouse, 100-r.p.m. with
panel.

Central Illinois Public Service Co.
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Mattoon, Illinois

NOTICE TO ADVERTISERS

Owing to the holiday May 30th, the "Searchlight" pages of the May 28th issue will close for press a day earlier than usual. Copy for this issue should therefore reach us by 10 A. M. Tuesday, May 24th.

Advertisements for the Searchlight Section



Can be received at the
New York Office of
Electric Railway Jour-
nal until 10 a.m.

Thursday

For Issue out Saturday

R. R. TRACK
Accessories for 80-lb. A. R. A. Rail
WAR DEPARTMENT SALES
BY SEALED BID

Quantities and Locations

**Splice Bars for 80-lb.
A.R.A. Type "B" Rail**

82,907 pairs at Norfolk, Va.

492 pairs at Port Newark, N. J.

Total 83,399 pairs.

**Rail Braces for 80-lb.
A.R.A. Type "B" Rail**

86,208 at Norfolk, Va.

17,312 at Kearney, N. J.

39,460 at Chicago, Ill.

Total 142,980 rail braces.

All bids must be received not later than 3 P. M. Eastern Time, June 2nd.
For full particulars on this sale of new material, write to the

Office, Chief of Engineers
Room 2830, Munitions Bldg., Washington, D. C.

FOR SALE
1½ to 2-ton Winther
AUTO TRUCK
Model 39—1919

Sewall Cushion Wheels. Tires in fair condition.

Covered express body with platform tower adjustable from 11-ft. to 16-ft. above ground. In running condition — needs painting. Trucks suitable for overhead trolley repair and construction work or street light trimming and lamp renewals.

For examination call on F. S. Freeman, Supt. of Power, 439 Albany St., Boston, Mass.

Proposals should be mailed to Boston Elevated Railway Co., Edward Mahler, Purchasing Agent, 108 Mass. Ave., Boston

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AND FITTINGS

— WRITE FOR BULLETINS —
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PITTSBURGH, PA.

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ADJUSTERS

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Automatic devices are safe and economical. S-W brake slack adjusters are no exception. They take up the slack in such a manner that the brake shoe gets an evenly distributed wear at every

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S-W brake slack adjusters eliminate the old-time night inspections, waste of air because shoes are always at the correct distance from the wheel, and unnecessary strains on the brake rigging.

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233 37th Street, BROOKLYN, N. Y.



WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Circuit Breakers
Roller-Smith Co.

Air Receivers
Ingersoll-Rand Co.
Western Elec. Co.

Ammeters
Roller-Smith Co.

Anchors, Gny
Electric Service Supplies Co.
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Midvale Steel & Ordnance Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
More-Jones Brass & Metal Co.

Babbitt Devices
Columbia M. W. & M. I. Co.
Western Elec. Co.

Badges and Buttons
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co., The
Western Elec. Co.

Batteries, Dry
National Carbon Co. Inc.
Nichols Lintern Co.
Western Elec. Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
Post & Co., Inc., E. L.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Ohio Brass Co.
St. Louis Car Co.
Western Elec. Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.
Roller-Smith Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & Mfg. Co.

Book Publishers
McGraw-Hill Book Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Bores—Junction and Outlet
National Metal Molding Co.

**Brackets and Cross Arms (See also
Poles, Ties, Posts, Etc.)**
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Western Elec. Co.

Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Smith-Ward Brakes Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

**Brakes, Brake Systems and Brake
Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.
Western Elec. Co.

Brooms, Track, Steel or Rattan
American Rattan & Reed Mfg. Co.
Western Elec. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
National Carbon Co. Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
National Carbon Co., Inc.
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

**Bushings, Case Hardened and
Manganese**
Bemis Car Truck Co.
Brill Co., J. G.
National Metal Molding Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Cambric, Yellow & Black Varnished
American Di-Electric, Ltd.
Irvington Varnish & Insulator Co.

**Cambric Tapes, Yellow & Black
Varnished**
American Di-Electric, Ltd.
Irvington Varnish & Insulator Co.

**Carbon Brushes. (See Brushes,
Carbon)**

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

**Cars, Passenger, Freight, Express,
etc.**
American Car Co.
Brill Co., The J. G.
Knibman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Midvale Steel & Ordnance Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
General Electric Co.

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Copper**
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Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Earl, Chas. I.
Electric Service Supplies Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.

Celling, Car
Pantasote Co.

Checks, Employees
American Railway Supply Co.

Circuit Breakers
Automatic Reclosing Circuit
Breaker Co.
Cutter Elec. Mfg. Co.
Don-O-Lac Co.
General Electric Co.
Roller-Smith Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

**Clamps and Connectors for Wires
and Cables**
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

**Cleaners and Scrapers—Track (See
also Snow-Plows, Sweepers and
Brooms)**
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.
Western Elec. Co.

Clusters and Sockets
General Electric Co.

**Coal and Ash Handling. (See Con-
veying and Hoisting Machinery)**

Coil Bending and Winding Machines
Comstock Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & Mfg. Co.

Colls, Choke and Kieking
Electric Service Supplies Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Combustion Systems
Engineer Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Don-O-Lac Co.
Eureka Co.
General Electric Co.
Mica Insulator Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Chicago Pneumatic Tool Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Concrete Products
Massey Concrete Products Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Condenser Papers
Irvington Varnish & Insulator Co.

Conduits, Flexible
Tubular Woven Fabric Co.

Conduits, Interior
National Metal Molding Co.
Western Elec. Co.

Connectors, Solderless
Dossert & Co.
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
Don-O-Lac Co.
Eureka Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.

Cooling Systems
Spray Engineering Co.

Copper Wire
Anasconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Koebling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.
Trolley Supply Co.

Cord Connectors and Conplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Conplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. Brake Co.

Cranes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Crescote
Barrett Co., The

Crescoting
Barrett Co., The

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

**Crossing Signals. (See Signals,
Crossing)**

Crossings, Frog & Switch
Wharton, Jr., & Co., Wm.

Crossings, Manganese
Indianapolis Switch & Frog Co.

**Crossings, Track. (See Track,
Special Work)**

Culvert Pipe, Concrete
Massey Concrete Products Co.

Culverts
Armed Iron Culvert & Flume
Mfgs.
Canton Culvert & Silo Co.

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Pont Fabrikoid**
Du Pont de Nemours & Co., Inc.
E. I.

**Curtain Materials (Window) Du
Pont Fabrikoid**
Du Pont de Nemours & Co., Inc.
E. I.

Curtains and Curtain Fixtures
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Electric Service Supplies Co.
Pantasote Co.
St. Louis Car Co.

Dealer's Machinery
Archer & Baldwin
Cleveland Armature Works
Electric Equipment Co.
Foster Co., H. M.
Hyman Michaels Co.

**Derailing Devices. (See also Track
Work)**
Cleveland Frog & Crossing Co.
Wharton, Jr., & Co., Wm.

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Electric Service Supplies Co.


Detective Service
Wish Service, P. Edward

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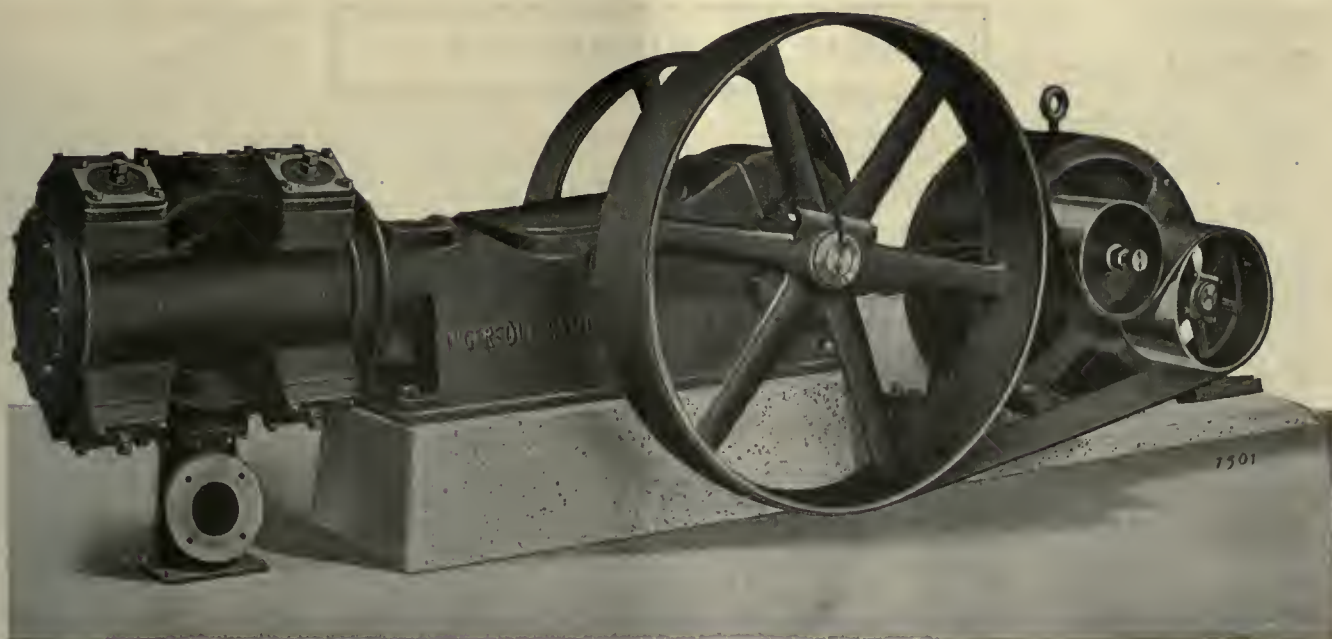
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- Door Operating Devices**
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National Pneumatic Co., Inc.
- Doors and Door Fixtures**
Brill Co., The J. G.
Dahlstrom Metallic Door Co.
General Electric Co.
- Doors, Folding Vestibule**
National Pneumatic Co., Inc.
- Draft Rigging.** (See Couplers)
- Drills, Rock**
Ingersoll-Rand Co.
- Drills, Track**
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.
- Dryers, Sand**
Electric Service Supplies Co.
Zelicker Supply Co., Inc.
Walter A.
- Electrical Wires and Cables**
American Electrical Works
Roebbing's Sons Co., J. A.
- Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bylesby & Co., H. M.
Clark Management Corp., E. W.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Gould, L. E.
Hemphill & Welle
Holst, Engelhardt W.
Horton Barker & Wheeler
Jackson, Walter
Jacobs & Co., J. L.
Kelly Cooke & Co.
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Stone & Webster
White Engineering Corp., The J.G.
Wolf, Mark
- Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
- Fare Boxes**
Cleveland Fare Box Co.
Economy Electric Devices Co.
Johnson Fare Box Co.
Ohmer Fare Register Co.
National Railway Appliance Co.
- Feed Water Heaters**
Schutte & Koerting Co.
- Fences, Woven Wire and Fence Posts**
American Steel & Wire Co.
Western Elec. Co.
- Fenders and Wheel Guards**
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works
- Fibre and Fibre Tubing**
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.
- Field Cols. (See Cols.)**
- Filters, Water**
Scaife & Sons Co., Wm. B.
- Flaximum Insulation**
National Railway Appliance Co.
- Floodlights**
Electric Service Supplies Co.
- Flooring Composition**
American Mason Safety Tread Co.
Western Elec. Co.
- Floor Plates**
American Abrasive Metals Co.
- Forgings**
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.
- Frogs, Track.** (See Track Work)
- Funnel Castings**
Wharton, Jr., Inc., & Co., Wm.
- Fuses and Fuse Boxes**
Columbia M. W. & M. I. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.
- Fuses, Refillable**
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
- Gages, Oil and Water**
Ohio Brass Co.
- Gaskets**
Power Specialty Co.
Westinghouse Traction Brake Co.
- Gas-Electric Cars**
General Electric Co.
- Gas Producers**
Westinghouse Elec. & Mfg. Co.
- Gates, Car**
Brill Co., The J. G.
- Gear Blanks**
Standard Steel Works Co.
- Gear Cases**
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Thayer & Co.
Westinghouse Elec. & Mfg. Co.
- Gears and Pinions**
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
- Generating Sets, Gas-Electric**
General Electric Co.
- Generators**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.
- Gong (See Bells and Gongs)**
- Graphite**
Morganite Brush Co., Inc.
- Greases.** (See Lubricants)
- Grinders and Grinding Supplies**
Metal & Thermit Corp.
Railway Track-work Co.
Western Elec. Co.
- Grinding Blocks and Wheels**
Railway Track-work Co.
- Guards, Trolley**
Electric Service Supplies Co.
Ohio Brass Co.
- Harps, Trolley**
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Monsley Trolley & Mfg. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works
Western Elec. Co.
- Headlights**
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.
- Headlining**
Pantasote Co.
- Heaters, Car (Electric)**
Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter
- Heaters, Car, Hot Air and Water**
Cooper Heater Co.
Smith Heater Co., Peter
- Heaters, Car (Stove)**
Electric Service Supplies Co.
Smith Heater Co., Peter
- Holsts and Lifts**
Chicago Pneumatic Tool Co.
Columbia M. W. & M. I. Co.
Ford Chain Block Co.
Niles-Bement-Pond Co.
Toledo Bridges & Crane Co., The
- Hose**
Ingersoll-Rand Co.
- Hose, Bridges**
Ohio Brass Co.
- Houses, Station, Watchmen's, Concrete**
Massey Concrete Products Corp.
- Hydraulic Machinery**
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.
- Injectors**
Schutte & Koerting Co.
- Instruments, Measuring, Testing and Recording**
Economy Electric Devices Co.
General Electric Co.
Roller-Smith Co.
Thompson-Levering Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.
- Insulating Cloth, Paper and Tape**
American Di-Electric, Ltd.
General Electric Co.
Mica Insulator Co.
Sherwin-Williams Co.
Westinghouse Elec. & Mfg. Co.
- Insulating Varnishes**
American Di-Electric, Ltd.
Irvington Varnish & Insulating Co.
- Insulation.** (See also Paints)
American Di-Electric, Ltd.
Anderson M. Co., A. & J. M.
Delph Co., J. C.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
- Insulation, Slot**
Irvington Varnish & Insulator Co.
- Insulators.** (See also Line Material)
Anderson M. Co., A. & J. M.
Don-O-Lac Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.
- Insulator Pins**
Electric Service Supplies Co.
Hubbard & Co.
- Jacks.** (See also Cranes, Hoists and Lifts)
Buckeye Jack Mfg. Co.
- Joints, Rail**
Rail Joint Co.
Zelicker Supply Company, Inc., Walter A.
- Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
Railway Roller Bearing Co.
- Lamp Guards and Fixtures**
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
National Electric Specialty Co.
Westinghouse Elec. & Mfg. Co.
- Lamps, Arc and Incandescent.** (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
National Electric Specialty Co.
Western Elec. Co.
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"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

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Car Steps
Floor Plates
Station Stairs
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cast together

THE DIFFERENTIAL STEEL CAR CO.

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MASON SAFETY TREAD—Lead or carborundum filled; non-slippery;
prevents accidents; cuts out damage suits.
KARBOLITH CAR FLOORING—For steel cars; sanitary, light weight,
fire proof, non-slippery.

STANWOOD STEPS—Self-cleaning, non-slippery, light.
Over six million feet used without accident being reported within the knowl-
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Car Heating and Ventilation

is one of the winter problems that you must
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to take care of both, with one equipment.
Now is the time to get your cars ready for
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When you sign with us a contract for Collier Service we recognize that that contract implies a mutuality of interest.

It is to our interest to supply your spaces with cards that will raise the whole tone of your service by making your cars cheerier, more attractive and symbols of the best in the community. Good advertising atmosphere does these things in a car just as surely as in a magazine or newspaper.

And it is to your interest to see that the continuation and continual betterment of such standards is made possible by renewing your contract with Collier Service to the end that your car card advertising may remain a source of steady, unfailing worriless income.

That way lies co-operation or mutuality of interest.



Candler Building, New York

This \$2,000,000 Shop was built for Your Road



IT was built to do electric railway work and built by doing such work well. Orders from electric railways have built our business.

No matter what you want made, it would be good business to let us figure on it. Put us on the basis of competing with your own or any other shop — in price, quality or deliveries.

Scan the list of some of the things we are regularly producing. These items by no means cover our facilities or our experience.

Whatever you need now, send us your blueprints and specifications. This will cost you nothing and may save you much.

We are in a position to submit especially favorable figures at this time. We have large stocks of materials purchased at near-bottom figures. We



pass the savings on to our customers.

Investigate one item now — trolley wheels, or forgings for example.

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Our Rattan Department is equipped with the most modern machinery for weaving and lining seating rattan.

It is furnished, both the canvas lined for seat cushions and the unlined for backs, in all widths 14 to 36 inches, and is carried in stock for prompt shipment.



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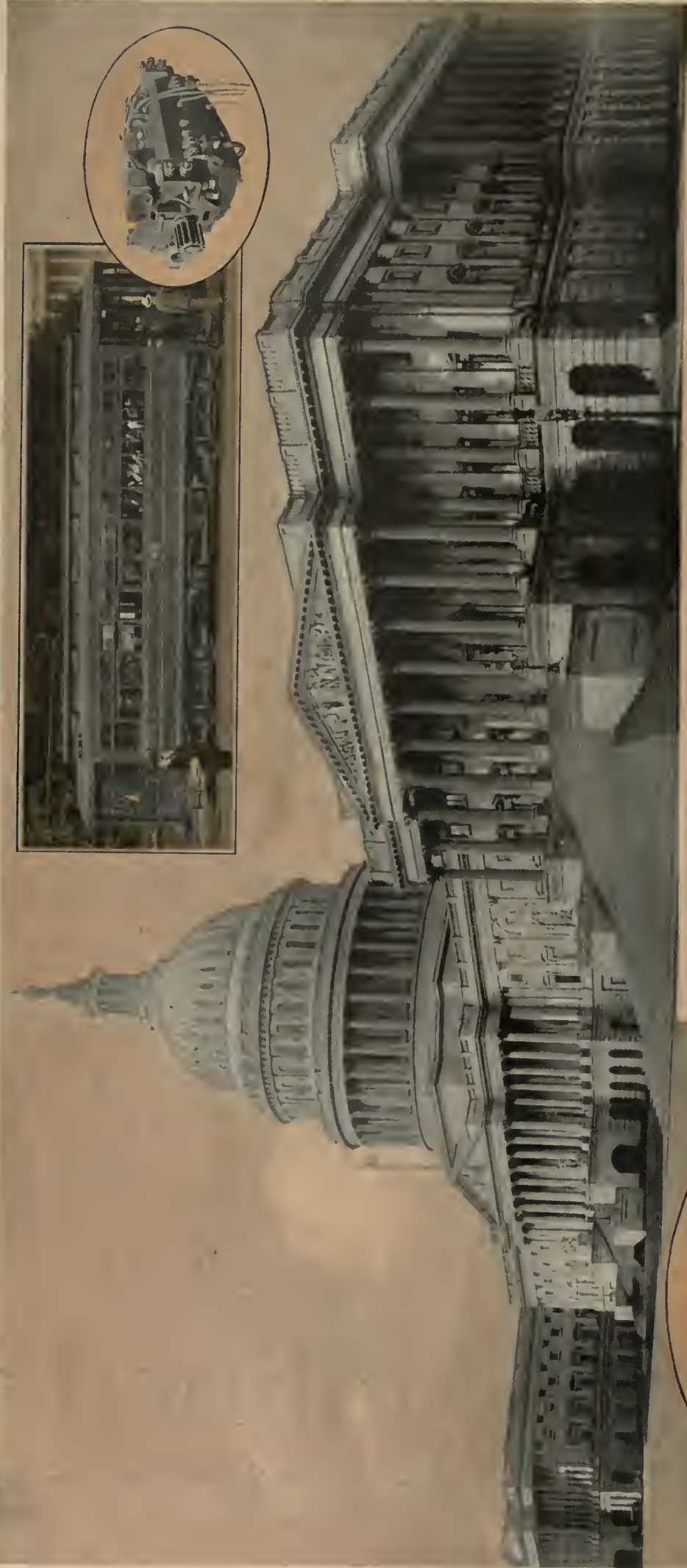
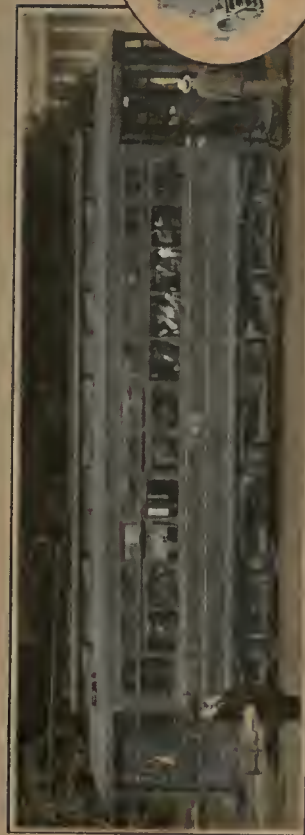


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Lined and Unlined



At the Nation's Capital

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Don't Overlook the Value of the Safety Car



When national emergency demanded maximum efficiency of the country's transportation system, standard safety cars were used.



Where railway operating economy has been effected, safety cars will generally be found in service.



With the safety car many roads have recovered the good will of the public, and transformed loss into profit.



Why not consider the initial investment for safety cars entirely upon a basis of what they will earn during the coming busy summer season.

Specify Westinghouse No. 508-A Motors and Control for all Standard Safety Cars

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Westinghouse

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors

HENRY H. NORRIS, Managing-Editor

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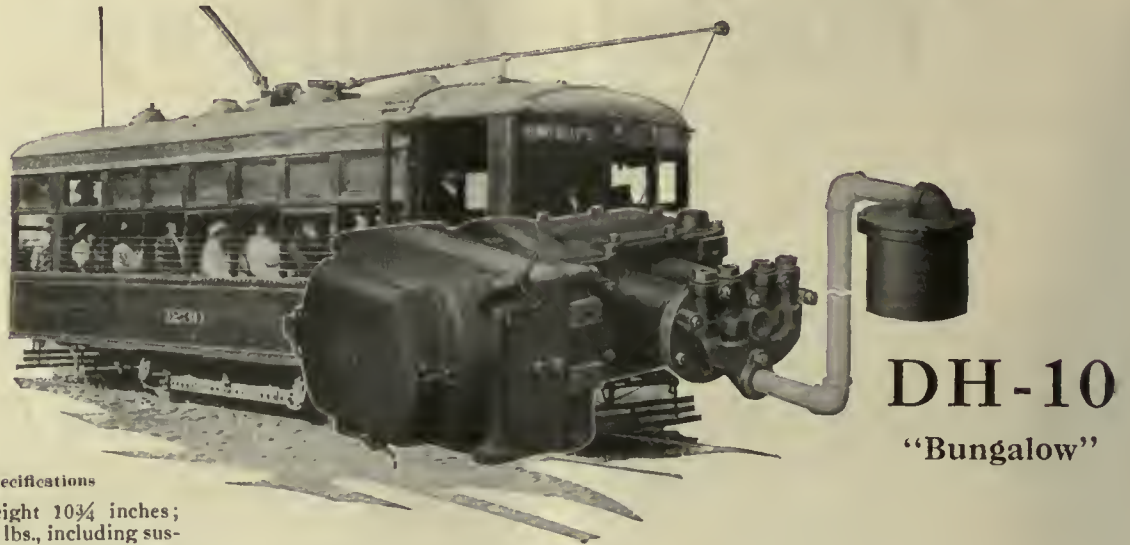
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Circulation of this issue, 6,250

A Superior Air Compressor for the Small Car



Specifications

Overall height 10¾ inches;
weight 420 lbs., including sus-
pension irons, brackets and
bolts; displacement 10 cu. ft.
per minute when operating
against 100 lbs. on 600 volts.

WHEREVER LIGHT EQUIPMENT IS USED

THE DH-10 "Bungalow" has established itself as the most serviceable 10-foot Compressor in the Traction Field. As a small machine, designed especially for small, low-built, light-weight cars, it has appealed generally to electric railway operators who appreciate the importance of keeping their equipment nicely "balanced" so as to insure the greatest possible economy consistent with safety and efficiency.

AN INEXPENSIVE UNIT

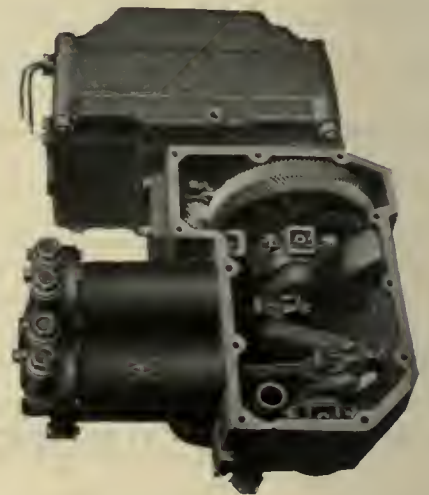
Owing to its high-class construction and superior service, the DH-10 is recognized as an attractive investment from the financial standpoint.

It materially reduces the expense of up-keep usually attaching to the ordinary compressor; is easy to assemble, permits ready access to all working parts, requires but slight attention, possesses the highest degree of durability—these features all combining to make for extremely low maintenance cost.

The design permits continuous operation for extended periods without possibility of a dangerous rise in temperature.

Send for Publication No. 9045

Note:—The complete line of Bungalow Compressors includes three sizes of 10, 16 and 25 cubic feet displacement, the designations of these being DH-10, DH-16 and DH-25.



POSITIVE LUBRICATION

An ingenious carrying system insures a constant and well-regulated distribution of oil over all the working parts. Such adverse conditions as low speed and diminished oil supply in the crank case have no effect on the efficiency of this arrangement. It is positive in every respect.

Westinghouse Traction Brake Company

General Offices and Works: Wilmerding, Pa.

"Fourteen Miles East of Pittsburgh"

New York
San Francisco

Washington
Pittsburgh

Chicago
St. Louis



And now New York City. One of the twenty-eight safeties ordered for Richmond, a borough of New York City.

The Genuine Safety Car Is Chosen by the New York City Administration, Too!

The administration of the City of New York had promised the people of its smallest borough, Richmond, good service in restoring the Midland Railway.

On Dec. 1, 1920, it began to make good that promise in the most effective way we know of—by the installation of twenty-eight standard Safety Cars, which are in charge of the Department of Plants & Structures, the City of New York.

All credit to the Administration for following the worthy example set by the Brooklyn Rapid Transit Company, which is operating several hundred genuine safeties on many lines of New York's biggest borough.

Big borough or small borough, village or metropolis, country or city, it's always the same story of success when the car used is a Safety Car, moreover,

It is a Safety Car Only

when equipped with automatic, laborless apparatus, so interlocked that regardless of the illness or distraction of the operator the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the air brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.



Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis

Chicago San Francisco New York Washington Pittsburgh

Phono-Electric

at an important Tacoma Junction



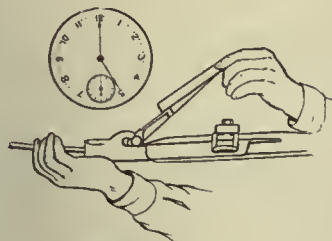
This location in front of the Post Office at Tacoma was one of the great intersections during war times, for it was here that the masses of shipyard workers transferred to the Municipal Railway.

Through the use of Phono-Electric Trolley Wire at this and other busy points, there was assured a higher reliability of power supply service than would have been possible if dependence had been placed on copper.

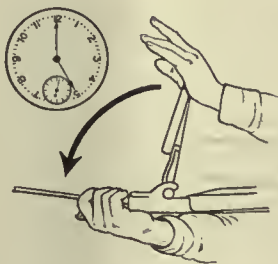
Bridgeport Brass Company
Bridgeport Connecticut

O-B Trolley Frogs—With Cam Tips

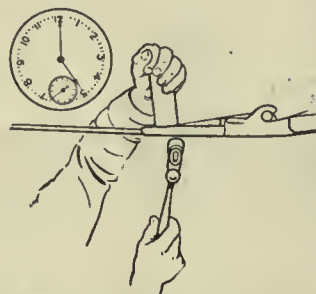
Clip minutes from emergency work



Slip tip under hooks—



turn over and down on the wire—



clench the lips and the job is done.

Linemen are encouraged to their best efforts by the simplicity of O-B Cam Tips.

1—2—3 and the job is done. See the pictures above. A hammer is the only tool. And the work is done thoroughly because it is easy.

In emergencies when the traffic is clamoring, in bad weather, or at night, Cam Tips mean quicker work and better work.

Add weeks to service life.

After they are on, Cam Tips get in more good work. They lead the wheel smoothly from wire to pan and so prevent wear and arcing. They can't loosen up in service because the Cam holds them down.

Their tough bronze absorbs wear and saves wire, wheel and pan. O-B Cam Tips are renewed as easily and quickly as the first installation.



Beside O-B Frogs, there are O-B Cross-overs, Section Insulators and Strain Plates equipped with Cam Tips.



O-B Type D Frog—Patented—with long (6 in.) Cam Tips.

Long Tips—instead of short (2½ in.)—multiply the smooth-operating characteristic. They add only about four or five percent to the cost of the frog.

THE OHIO BRASS COMPANY, Mansfield, Ohio

New York
Chicago

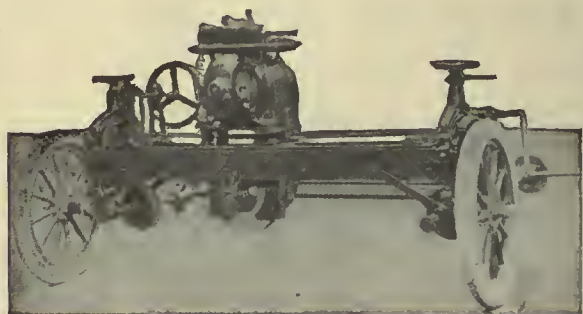
Philadelphia
San Francisco
Paris, France

Pittsburgh
Los Angeles



Manufactures: Trolley Materials, Rail Bonds, Car Equipment; Third Rail Insulators; High Tension Porcelain Insulators.

Don't Relay—Rejuvenate



The Universal Track Grinder has many features which facilitate and increase the accuracy of its work.

Miles upon miles of electric railway is running on track that should be condemned. It would be cheaper for the road to lay new track than to continue operation on the worn rail. But rail may be worn—badly worn—without being worn out. Modern welding and grinding add years to rail after it reaches a condition that formerly would have been considered beyond repair.

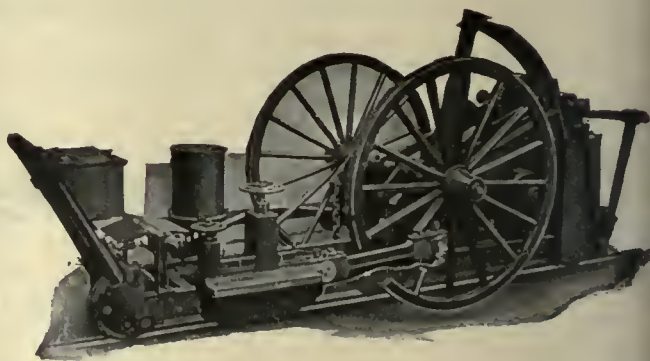


For getting into the grooves of girder rails, frogs, switches, etc., and for removing surplus metal used to fill up low or cupped joints the Atlas or the Universal Rail Grinder will produce excellent results.

Corrugated rails, cupped joints, battered special work can be rejuvenated by grinding. The sooner the grinding is done the less it costs. As to the choice between grinding or not grinding, there is only one answer that can be made by a road that is not overburdened with its surplus.

The cost of grinding is negligible in comparison with the cost of doing nothing.

Being specialists in supplying rail grinders, we may be able to help you decide what is best for your road. We are ready to try.



The Reciprocating Grinder is especially adapted to grinding out corrugations, slightly cupped and new joints where a planetary grinding surface facilitates the work.

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia



Why Do Pennsylvania Concrete Road Specifications Call for 56 Pounds of *Effective* Steel per 100 Square Feet

Because Engineers know that only effective steel, (that is that steel actually under stress) adds strength to any structure.

When specifications for Steel Ties for paved street track construction call for the maximum effective steel per foot of track INTERNATIONAL STEEL TWIN TIES are indicated.

STEEL TWIN TIES offer the maximum of effective steel because of the twin feature, (protected by American, Canadian and foreign patents) which combines a longitudinal plate-bearing with reinforcing tie members.

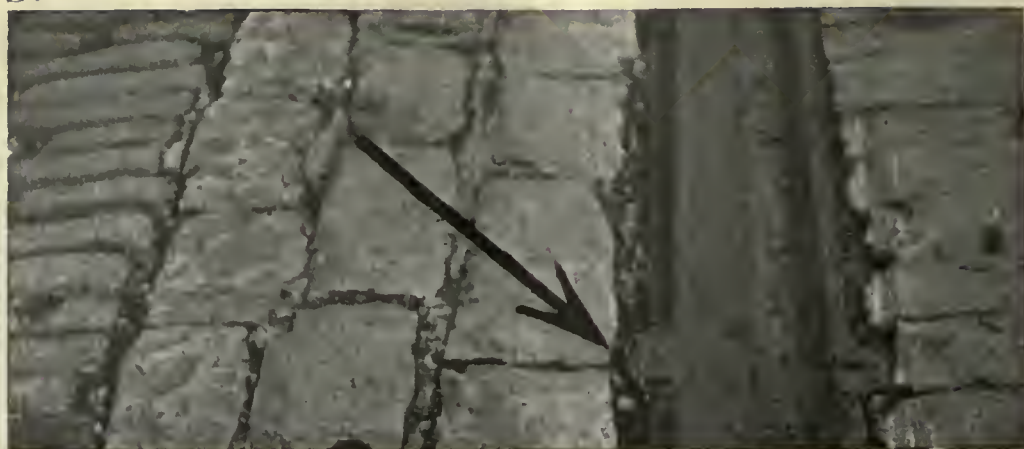
If part of your maintenance appropriation is spent for effective steel it will be well spent. It buys you effective ties which build effective track.

Track plans, data and delivery prices forwarded when you request.

The International Steel Tie Company
16702 Waterloo Road, Cleveland, Ohio

International Products:—Steel Twin Ties; Steel Crossing Foundations; and Steel Paving Guard; are manufactured and sold in Canada by the Sarnia Bridge Company, Ltd., Sarnia, Ont.

Steel Twin Tie Track



Practically every Railway System which started using

Thermit Insert Welds

has continued to use them with increasing quantities.

A large street railway system in Texas with approximately 12,000 welds installed since 1913 propose to do considerably more work this year, owing to the splendid record of the welds already installed. Their vice-president has informed us that the number of broken welds has proved to be less than one in two thousand.

The engineer, maintenance of way, of a large company in the Middle West which has been one of the pioneers to install Thermit Insert Welds, stated that a careful cost investigation had been made and that *there was not enough difference between the cost of the Thermit weld and other types, which they have used to make it worth while to consider the other*

types for a minute. The engineer, maintenance of way of a large New England system using Thermit extensively recently made a statement that the Thermit Insert Weld, while perhaps the most expensive, was the *most satisfactory*.

A large street railway system in Pennsylvania has over 10,000 Thermit Insert Welds in its tracks, put in about 7,000 last year and contemplate as much more this year.

Let us know the section number of the rail which you wish to weld so that we can ship welding material suitable for the purpose. On receipt of an order for material and apparatus, we will send an expert demonstrator to instruct your men so that you can carry on this work yourselves.

Send for our latest Railwelding Pamphlet 3932

Metal & Thermit
120 Broadway



Corporation
New York



THE Gear Case For REAL Service —KEYSTONE

KEYSTONE Steel Gear Cases have proven their ability to withstand vibration, jolts, jars and knocks from road-bed obstructions. They are made of soft special analysis steel of extra quality—the best to resist vibration. They are both riveted and electrically spot-welded—the rivets supply holding strength and the spot welds reinforce the rivets by preventing slippage. They are made with steel, malleable and forged steel brackets which are carefully designed and welded and riveted in place.

They are made for use with practically every type of railway motor—every type of case being of standard Keystone construction. Hundreds of the largest operating companies are using Keystone Gear Cases—Why not yours?

Write for data sheets

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Branch Offices: Boston, Scranton, Pittsburgh

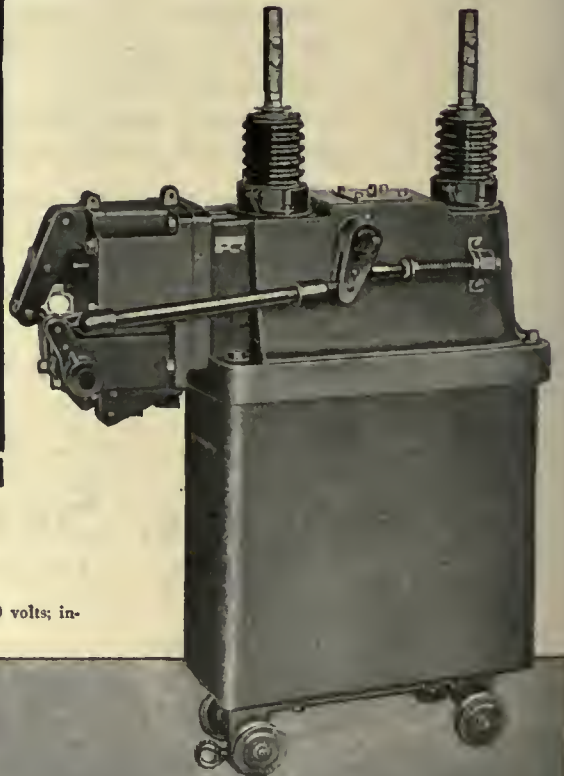
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

Pull It Out!



Like the drawer of a filing cabinet a CONDIT F-10 Removable Unit Circuit Breaker easily rolls in and out of its compartment. Saves space, increases capacity, obviates necessity of reconstructing cell for bigger units.

CONDIT ELECTRICAL MFG. CO.
Manufacturers of Electrical Protective Devices
Boston 27, Mass.



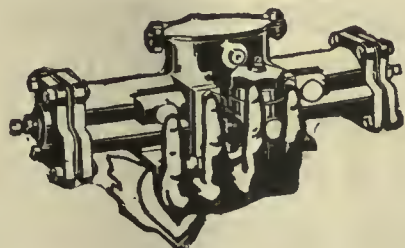
SPECIFICATIONS: Manually or electrically operated; 500, 800 and 1,200 amperes—25,000 volts; interrupting capacity 10,000 amperes—15,000 volts; 1, 2, 3 or 4 pole.

CONDIT

This Is the Age of Speed

Modernize!

Pneumatize!



The old-time hand-brake, hand-door electric car looked fast to the public of ten years ago.

To the public today, which has become accustomed to the fast-flying automobile, it looks slow.

Any and every use in transportation of slow *human power* where quick *machine* power can be employed must therefore appear to be out-of-date and needlessly tardy.

But once you modernize and pneumatize your cars with these famous electro-pneumatic devices as scores of others have done, *your* transportation equipment will win both admiration and increased patronage.

National Pneumatic

Door and Step Control

Motorman's Signal Lights

Door and Step Operating Mechanisms

Safety Interlocking Door Control

Multiple Unit Door Control

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.

50 Church St., New York

Edison Bldg., Chicago

Works: Rahway, N. J.

LESS MONEY *for Track Maintenance*

TRACK laid on Dayton Resilient Ties will last longer than any other known construction, because the resilient wood and asphalt of these ties absorbs the shocks and vibrations which directly cause the disintegration of foundations, the heaving and settling of joints and the resulting track failure.

Hundreds of installations have demonstrated beyond dispute that there is only one way to avoid the above conditions—that is thru applying the principle of resiliency to your track construction.

A white oak block imbedded in a cushion of asphalt and contained in an iron box is the principle underlying the Dayton Resilient Tie and stands as a perpetual shock absorber for your foundation.

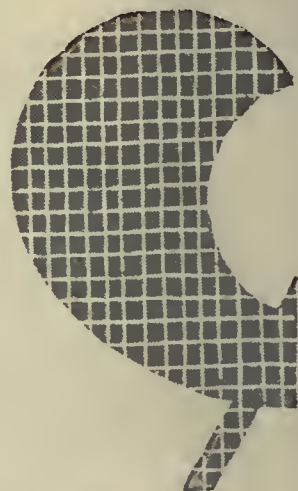
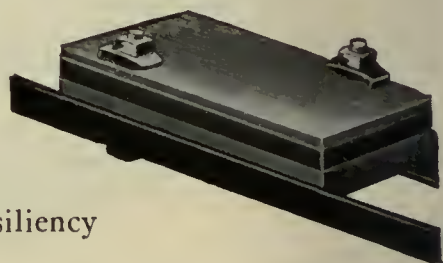
The Joint Tie is designed to provide more than double the bearing surface at the rail joint and has a steel plate for additional strength. The plate also acts as a welding base, eliminating the necessity of bonding. Perfect support and resiliency are given this most vulnerable spot.

Not only is the cost of track maintenance reduced, but you also diminish the upkeep of rolling stock. Ordinary repairs for rolling stock run into large figures and increase 100% when operating over bad track.

Think how carefully you guard the car body, motors, trucks, etc., by applying resiliency to their supports. Then why not give the same consideration to the base on which the whole structure rests?

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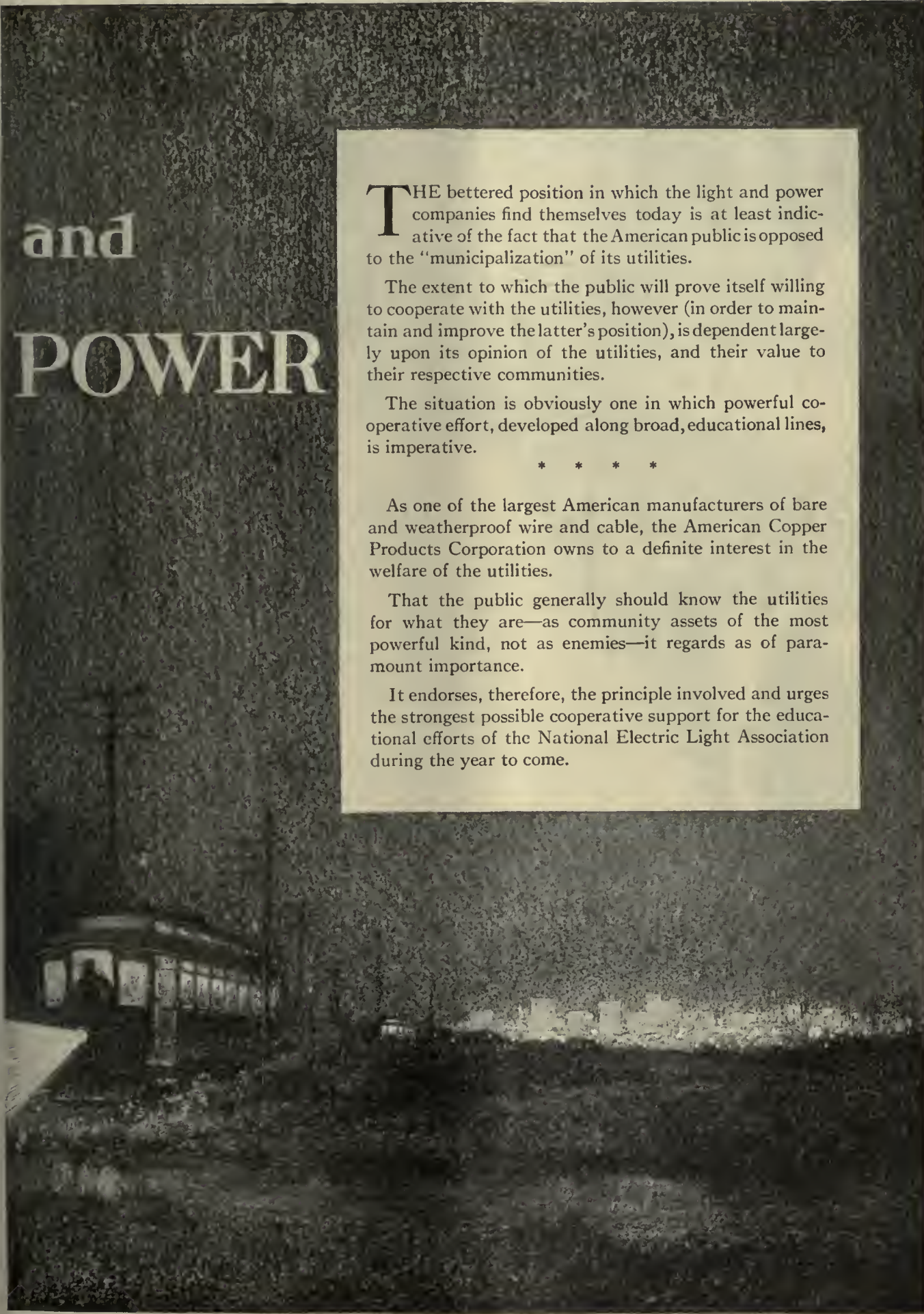
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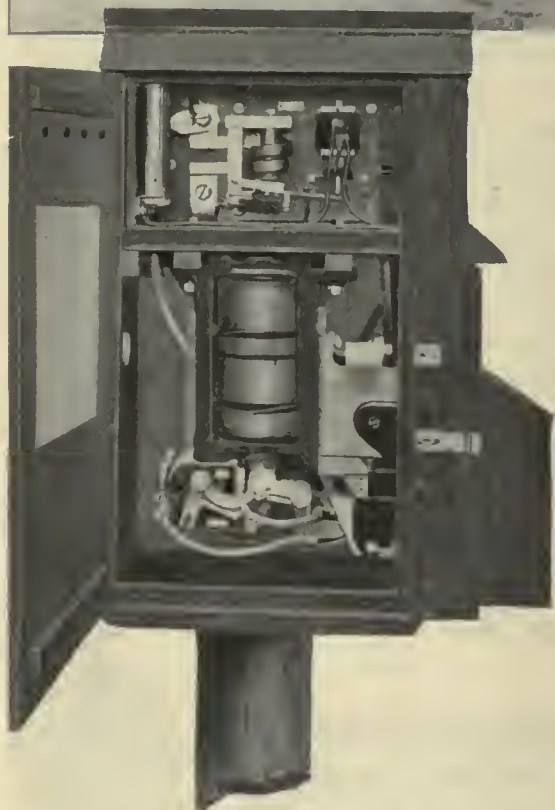
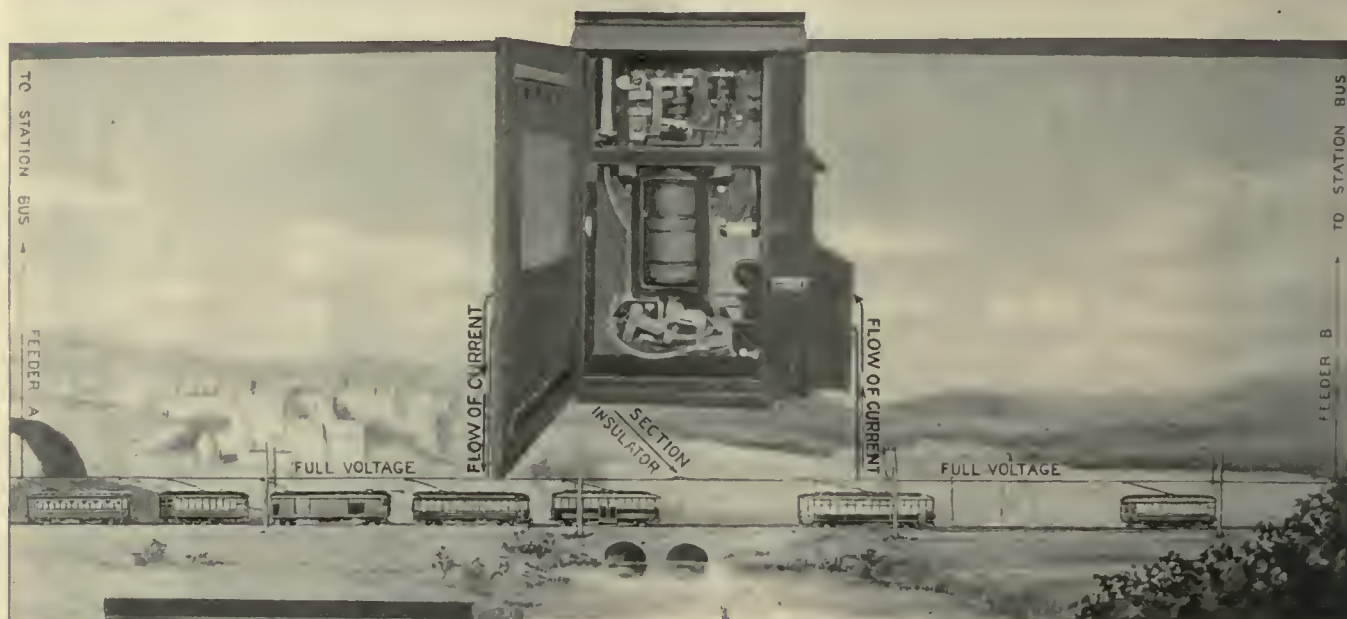
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Volume 57

New York, Saturday, May 28, 1921

Number 22

Now the One-Man Interurban Car

ONE-MAN safety cars for use in city service have become so common that they are accepted as a matter of course. Now, in this issue, an article by C. T. Dehore of Cincinnati, Ohio, relates how one-man, double-truck safety cars have recently been installed on a small interurban road running out of that city with satisfactory operating results and a great improvement in the net earnings. A total saving of \$29,905 a year in operating costs, creditable to the new type of cars as compared to the old two-man, heavier cars is expected. On a per car basis this amounts to \$5,981 per annum. This total saving represents a return of 79.7 per cent on the net investment made to accomplish the improvements, which was \$37,500.

There are many small interurban properties over the country on which the use of such light-weight one-man cars should be satisfactory from the standpoint of service. On some of them it would appear that a step of this kind materially to reduce operating expenses would be very much in order if the property is ever to be expected to produce any return to the shareholders. On fairly short lines, where there is no demand for very high speed, such light-weight cars could be adopted with safety, and the power saving that would result is very material, as brought out in the article mentioned. Of course, one-man cars for interurban service would naturally be equipped with double trucks in order to secure good riding qualities on open-type track, which is rarely as smooth as good city track, as well as to permit a free running speed higher than called for in city service and higher than is safe with a single truck.

As to operation with one man, there should be no particular difficulty inasmuch as the traffic requirements would rarely be of the exacting nature of city service. The number of stops per mile is much smaller and the length of standing time while loading and unloading passengers is of less importance as it forms a much smaller proportion of the total schedule than in city service. Furthermore, any abnormal delay in passenger exchange is more readily made up because of the longer running periods. Hence, in view of these differences—lower density of traffic, fewer stops, higher speed, longer distances—it is logical to assume from present knowledge of the standard one-man safety city car that the similar car for interurban service could be made larger than the city car without overburdening the operator. These thoughts are quite evidently embodied in the design of the car described in Mr. Dehore's article.

While it is highly desirable that those interurban lines which connect important terminals and extend into sizable systems should be developed along the lines of heavy traction, it may well be recognized that those other lines which just run out into the country and stop (most of those radiating from Cincinnati being

excellent examples of the type) have no such future and that they can best be developed more along the line of street car practices. The paramount issue with most of them is to get the operating cost down to a basis comparable with their limited earning capacity, so that a surplus will be a possibility. The use of one-man, double-truck safety cars seems to offer an opportunity for more economical operation without introducing any particular hazards, though requiring some changes in operating practices. Hence a widening use of one-man, light-weight, double-truck safety interurban cars in the next few years may not be an unexpected development.

Electric Railway Industry Must Expand with Its Opportunities

THE men who have been brought up in the steam railroad field are apt to look condescendingly in a professional way on their electric railway brethren. They feel that the "trolley" men know light transportation only, while they themselves are engaged in real railroading. This attitude must be changed, and that by demonstration of the fact that there is no sharply defined boundary between heavy and light traction. Electric railways are handling short-haul passengers on a scale unheard of in the steam field, and they are doing a freight business also of no mean proportions. A first-class, high-speed interurban railway or rapid-transit system is giving a service in every way commensurate with corresponding steam transportation. When the steam roads are in a position to finance electrification extensively they will find that many of their problems have already been solved for them by the "trolley" fellows. The multiple-unit cars used in large numbers by the electric railways and to an increasing extent by steam railroads are ideal for intense suburban service. Again, the electric locomotive itself is a product of electric railway development.

The application of the electric motor to transportation has developed in three stages. First the horse, the mule, the cable and the steam "dummy" were supplanted. Then the elevated steam lines were electrified and high-speed interurbans were built. Last, and the greatest development of this still lies largely in the future, the steam locomotive is being displaced by the electric locomotive. This development was traced by Frank J. Sprague in his Franklin Institute address, abstracted this week. In other words, the electric motor is gradually pervading the whole field of rail transportation, which is essentially one field. The engineers and manufacturers who are leading in the campaign for railroad electrification aim simply to convince operators who have been "raised" on the steam engine that a better motive power is now available. The performance of the electric motor elsewhere, and to a limited extent in this field, ought to inspire respect for its power producing characteristics.

The Passing of the Woman Conductor

THREE years ago, or during the labor scarcity caused by the war, many women were employed as conductors on cars both in America and Europe, although the practice was followed to a greater extent abroad than here. Since the armistice the number has decreased for one cause or another. On the New York City properties the direct reason was a law passed by the New York Legislature in May, 1919, forbidding the employment of women on trolley cars before 6 a.m. or after 10 p.m. or for more than nine hours a day. In January of the same year the engagement of any more women as conductors in Detroit was forbidden by the National War Labor Board after the dismissal of those employed by the company had been demanded by the union. A few women conductors or guards are still employed on the Hudson & Manhattan Railroad and on some other lines, but in general throughout the country they have disappeared from service as members of train crews.

The subject may almost be said to have been forgotten by railway men, but has been brought up through a report recently issued by the Women's Bureau of the United States Department of Labor and reviewed in these columns. The conclusions of this report are generally favorable to the service as suitable to women and less onerous and more highly paid than many other lines in which women are employed. Before the subject is passed entirely, it might be worth while to put on record some of the conclusions reached from the railway standpoint during a somewhat limited trial in this country of women conductors.

In the first place there is some additional expense involved to a company employing both women and men in the transportation service over that required when only men are employed, owing to the necessity of providing separate quarters at the carhouses and elsewhere. This means that even if everything else was equal, to make the engagement of women no more expensive to the company the women would have to receive a lower wage than the men. Just how much this differential would be it is hard to say, but it is obvious there would have to be some differential.

In the second place, the tendency toward the use of one-man cars, in the opinion of most operators, still further cuts down the opportunity for women as part of the transportation force. It is probable also that their less physical strength handicaps women for the position of conductor on some lines. Again, new legislation limiting the conditions under which work may be done or the hours in which it may be performed is apt to be more stringent in the case of women employees than with men employees, and any material difference in the conditions or hours permitted for the two classes would require a division into a favored and a less favored class, and this would interfere with seniority rules.

Finally, there is now no difficulty and there probably will not be for a considerable time, at any rate, in securing a sufficient number of men for platform service, so that there does not seem to be the same reason for the engagement of women as during the war.

Abroad, both in England and on the Continent, women have been employed as substitutes for motormen as well as conductors. Testimony as to their fitness for this work varies, but on some roads they are considered superior to men, or certainly to the men who could be hired at the same wages. The way in which this supe-

riority is shown is in the exercise of greater care and the acceptance of greater responsibility in their work. As the use of women as substitutes for motormen has been very limited in this country, American evidence on this point is not of much value.

The modern car has so many labor-saving appliances that much manual power is not required by either a conductor or motorman. Hence the tendency will be more to judge applicants on the basis of intelligence, faithfulness and similar qualities rather than on strength. Nevertheless, the greatest use for women, for some time to come, at any rate, in electric railway transportation service will probably be in the stations and offices and not on the cars.

Has Connecticut Shown the Way in Valuation Procedure?

THE recent valuation of the property of the Connecticut Company, made, as it was, by the Public Utilities Commission of the State, is of more than usual interest. It is what the commission calls a business-like valuation and marks a departure from the usual method of obtaining the fundamental information upon which a commission bases its final action. In this issue Mr. Knowlton finishes his analysis, started last week, of this valuation, and outlines the method by which it was possible to save so much time and money in obtaining the necessary data. A critical examination of this is recommended to all who are interested in valuation procedure. It should be kept in mind, however, that the purpose of this two-part article is to outline and analyze a method. Complete figures naturally cannot be given for application elsewhere and details of the method itself would probably have to be modified in case of its application to other properties.

Progress in valuation practice has, of course, been evident in recent years. This, however, has been chiefly in that the engineers of the various contending groups have agreed upon an appraisal figure for the physical property and thus avoided endless litigation. Instances are the Pittsburgh, Scranton and Nashville valuations. Another step was taken in New Jersey, where the engineers were asked to take the place of the commission, so to speak, and, considering all factors, to name the total valuation figure. But each of these has been accompanied by a long and expensive inventory, which is most undesirable both from the standpoint of expense and also delay and suspense. In these statements regarding the recent New Jersey valuation the inventories made during the previous valuations and used by the last engineers are considered a part of the total appraisal work.

The question is how to get away from this and Connecticut seems to have given one answer. Here more than \$50,000,000 worth of property (on a 1910-1915 price basis) was appraised in less than six months and historical value was also determined at a total cost to the commission of less than \$10,000. Several factors made this possible: the work was done largely by salaried engineers and accountants of the commission, who already had an intimate knowledge of the property; the commission specified that it wanted a "business-like" valuation; the records of the company were unusually specific and detailed as to the various facts needed. But these factors do not weaken the method, rather do they strengthen it. The method of appraisal itself is logical—the use of measuring sticks for outside

plant and the application of usual business judgment all through. It is of interest to note the relation of the total thus found to the historical cost, and that the appraised value of the physical property differed not more than 2 per cent from the book value of the company.

Most important, the commission accepts and uses this value in its report to the Legislature; the Legislature, in turn, bases its present program of railway legislation upon this report, thus tacitly accepting it as valid. The commission and legislative sanction of this method of appraisal is significant. More than ordinary weight may be given to the attitude of the Legislature in view of the fact that the chairman of the committee considering the report is himself an engineer of note in the State.

Objection to the method itself may be urged in that, by the adoption of unit yardsticks, instances of abnormal construction, of special installations, etc., may be neglected or minimized. But the inspection of the entire system and the method of obtaining a typical unit are both checks against this. And then, actually, way down in his heart, what valuation engineer is there who doesn't use the mile of track, the 1,000 ft. of overhead, the kilowatt of power station and substation as the real check or measure of the reasonableness and accuracy of his valuation, made by however detailed a method? There seems much to support the direct use of such figures if they can be determined with sufficient accuracy to carry weight in the individual case, and this is what Mr. Knowlton tries to show has been done in Connecticut. There are so many other factors than mere physical appraisal which really affect the final rate that it is a serious question whether the expenditure of so much time and money in determining this figure is really justified.

To be sure—to answer a self-evident question—no rates have yet been determined upon this as a base. But Mr. Knowlton shows within what wide limits an appraisal may vary without any effect upon a rate, and as a matter of fact, in how many cases has the valuation had an appreciable—still less a controlling—effect upon rates, anyway?

A valuation figure adopted means business life or death, economic success or failure, more often than anything else. It is fundamentally a business question rather than a rate question and is so recognized by the Connecticut Commission.

But what will valuation engineers do? Frankly, they may lose one source of lucrative practice. But they ought to be more anxious and willing than any one to adopt a business-like basis of appraisal and to save the time and drudgery of detailed inventory. Valuation is not constructive, though it may be necessary. Engineering is fundamentally constructive and engineers should welcome anything which will relieve them of non-constructive work so that their energies may be directed toward constructive lines.

A big question is the court attitude. Legal rules

of evidence have been largely responsible for present appraisal procedure. But there is encouragement in court attitude today. Note the "reasonableness" introduced by the Supreme Court, for example. And courts are more and more inclined to be business-like themselves and to allow commissions to establish their own procedure. In this case, the sanction of both commission and Legislature should have much weight in determining the attitude of the court and therefore the result of any possible court action should a case based on this valuation come up for review.

Viewed broadly, valuation procedure is tending in the right direction. The American Electric Railway Association valuation committee is studying the problem of how to reduce the time and expense of appraisals. It seems logical to approach a business question from a business angle. Connecticut has made a worth-while contribution in this connection to valuation procedure.

Tax Exemption Extended in Massachusetts

IT IS APPARENT that the members of the Massachusetts Legislature are satisfied that their street railways are not yet out of the financial difficulties which began before the war, but were brought to a head by the extreme conditions which that conflict caused. As reported elsewhere in this issue, the Governor's signature has recently made a law of the bill to exempt the companies for the next two years from the operation of the excise tax, imposed in commutation of the cost of repairing and maintaining highways and bridges.

The reputation of the old Bay State as a leader in wise and conservative legislation and regulation concerning her street railways is too well known to require further extensive comment at this time. Having from the beginning restricted the capitalization of the companies to actual cash investment and having prohibited the issue of stock at anything less than par, this State now shows a disposition to make reasonable provisions looking toward the protection of such investments. It is true that a number of companies in that state have been through a receivership, and many miles of track have been abandoned. Perhaps not in all, but at least in a goodly proportion, such cases have been where over-optimistic promoters have built in sparsely settled territories, or where lack of foresight on the part of the managements has resulted in financial embarrassment. No Legislature can be expected to go out of its way to offer protection in such cases. But the recognition by the Massachusetts Legislature of the general financial

hardships which the industry as a whole is suffering through no fault of its own is an encouraging sign.

The action of the Speaker of the House of Representatives of Massachusetts in standing up for and securing a reconsideration of the exemption bill, after the original motion was defeated, was an exceptionally courageous proceeding, in view of the apathy if not direct antagonism of the general public toward the financial prosperity of utilities.

Quotation from the Federal Electric Railways Commission Report

No. 22

THE electric railways should adopt the policy of setting aside a depreciation fund with which to take care of replacements and thus preserve the integrity of their investment. It would have a very wholesome effect upon credit. Such has not been the practice in the past. Deferred maintenance has accumulated to an alarming extent during the war period.

Generally speaking, regulating commissions have the power to prescribe methods of accounting and to establish the amount of the depreciation fund. This practice should be observed, and its adoption will improve the situation of the industry and be greatly in the interest of the public welfare.



SINGLE-END, DOUBLE-TRUCK, ONE-MAN SAFETY CAR FOR INTERURBAN SERVICE

One-Man Cars for Interurban Service

How the Cincinnati, Milford & Blanchester Traction Company Met a Difficult Financial Situation by Installing New Equipment and Making Such Changes as Would Greatly Reduce Operating Costs

By C. T. DEHORE
Cincinnati, Ohio

FACED with an inevitable receivership unless operating costs or earnings could be radically changed, the Cincinnati, Milford & Blanchester Traction Company, Cincinnati, Ohio, under the direction of J. P. Perrung, president and general manager, decided in January, 1920, to take immediate and drastic action to stem the tide of rising costs. The criticalness of the situation can be readily understood from the few words explaining that during one month in the fall of 1920 the cost of power alone was 60 per cent of the total receipts. It is said that had the changes which were effected been delayed three months longer the railroad probably could not have held out. As a result of the changes made, however, it will be possible to continue operation on the line, and in fact indications are that the financial crisis has been passed and that the company should now be able to wipe out its debts and become a paying property.

The changes which were decided upon and which were put into effect as quickly as the new equipment could be secured were these: The old 30-ton, forty-four-passenger, two-man cars were replaced with 15-ton, forty-seven passenger, one-man, double-truck cars. A 1,000-kw., 25-cycle generating station was shut down and arrangements were made for purchasing power from the Union Gas & Electric Company of Cincinnati at 13,200 volts 60-cycle frequency. For the 1,100-kw. capacity of 25-cycle substation equipment 400-kw. capacity of 60-cycle equipment was substituted. The fourth major change made was in connection with the light and power business handled by the company, wherein a 100-kw. frequency changer was displaced

with 250-kw. capacity in lighting transformers, which enabled the company to take on 250 new commercial customers.

The C., M. & B. T. line is 28.8 miles long and connects Cincinnati (Madisonville) with Blanchester, Ohio. In addition to handling passengers, freight, milk and express, the company does a general lighting and power business in towns along the line. Travel on the Blanchester end of the road is very light, while fairly good traffic is obtained on the Madisonville end, particularly in the warmer months, when summer homes and camps along the Miami River are open. The equipment formerly in use and the operating conditions generally were similar to those found on a great many other small interurban lines, namely, heavy, obsolete rolling stock with power supplied from a small-capacity and inefficient generating plant.

The old rolling stock consisted of eight passenger cars, three freight cars and two work cars. The passenger cars were in need of paint and repairs and had practically outlived their usefulness. They weighed about 30 tons each, were geared for high speed and were equipped with two different types of old-style motors. These cars were replaced, under the rehabilitation plan, with five 15-ton, forty-seven-passenger, single-end cars equipped with standard safety devices for one-man operation, probably the first cars of this type for interurban operation. They were built by the Cincinnati Car Company. They have a standard monitor deck roof, are 40 ft. long and 8 ft. 6 in. wide and have steel underframes and side-girder plates, wood posts and letterboards and composite superstructure.

There are eleven windows on each side, and notwithstanding the inclusion of a stove and toilet, seats for forty-seven passengers are secured by using the rear "platform" as a smoking compartment. This popular compartment will seat five passengers and it is separated from the main passenger section by a partition and a swinging door. The seats are the Hale & Kilburn 38-in. stationary type with rattan-covered spring cushions and backs. The heater is of the Jewel hot-air type with motor-driven blower. Lighting is obtained from ten 56-watt lamps arranged in a straight line through the center of the ceiling and used in combination with G.E. shade holders and receptacles fitted with holophane shades.

The trucks are of the arch-bar type with a combination semi-elliptical and spiral spring design and a wheelbase of 5 ft. 8 in., manufactured by the Cincinnati Car Company. The electrical equipment consists of four G.E. 264-A, 25-hp. sleeve-bearing motors, and one K-35 controller. A G.E. J-37 type headlight with the new design of "GECO" resistor is used. The air-brake equipment includes the type CP-27 compressor and type ML Form A governor. The cars are geared for a free running speed of about 32 m.p.h. and make a schedule speed of 20 m.p.h. Hourly service is given during the winter months and half hourly service during the summer.

Heretofore, power was manufactured in a steam plant located at Milford, 8.5 miles from the Madisonville end of the line. The equipment there consisted of four 200-hp. Stirling boilers and two engine-driven 500-kw., 370-volt, 25-cycle generators. The engines needed overhauling; the boilers were in only fair shape and an addition to the smokestack was necessary to replace a section blown down in a windstorm. The immediate repairs needed called for an expenditure of about \$3,500. The energy used for light and power customers was secured from a 100-kw. frequency changer located in the power house and consisting of a 370-volt, 25-cycle motor and a 2,300-volt, 60-cycle generator. This unit was badly overloaded and there was no reserve capacity available. In fact, the company had reached the point where it was forced to turn away new business.

To alleviate this situation and place the power cost on an economical basis a contract was negotiated with the Union Gas & Electric Company of Cincinnati where-

by this company built a 13,200-volt, 60-cycle transmission line to the railway company's substation at Indian Hill, where power is delivered and metered to the latter. The power contract is based on a fixed maximum demand charge with a sliding scale rate for actual energy consumed, so that the railway company has a chance to lower its rate by leveling off its load factor. As an instance of how this may be done, the railway company found that by changing its freight-car schedule slightly it was able to reduce the maximum demand charge about \$100 per month. An effort is now being made to secure some pumping load to be handled at night, which will further reduce the cost per kilowatt-hour.

As the power company has a 120,000-kw. turbine generating station of modern design and is in a position to furnish unlimited power, the railway company has laid out its distribution system so that it can be quickly and economically extended to serve new customers. An increase in the gross receipts from the light and power department of from \$2,000 to \$3,500 per month has been secured as the result of new customers connected.

Under the old system of operation the company had a 300-kw. substation at Indian Hill, 5 miles from Madisonville; a 400-kw. substation in the power house at Milford, 3.5 miles farther, and a 400-kw. substation at Newtonville, 9 miles from Blanchester. The total substation capacity was then 1,100 kw. Under the new plan only two substations are used, one at Indian Hill and the other at Newtonville. Each is equipped with one 200-kw., 600-volt, six-phase, 60-cycle G.E. commutating pole rotary converter. The total substation capacity on the system is thus seen to be 400-kw., sufficient for handling the new light-weight cars.

To make the changes necessary, as described briefly above, the company required an initial investment of \$63,000, against which there is a credit for salvage of about \$25,500, leaving a net capital investment of \$37,500 as outlined below:

INVESTMENT COSTS

Five new cars complete at \$9,000.....	\$45,000	
Two 200-kw. substations at \$6,500.....	13,000	
Three lighting transformer stations.....	5,000	
Total cost.....	\$63,000	
Less salvage:		
Six 4-motor cars.....	\$6,000	
One 1,000-kw. power station.....	15,000	
Three rotary converters, etc.....	4,500	25,500
Net investment.....		\$37,500



TWO INTERIOR VIEWS, ONE SHOWING FARE BOX, AT THE FRONT END AND THE OTHER THE SMOKING COMPARTMENT AT THE REAR END

COMPARISON OF OPERATING COSTS

	Old System	New System	Saving
Platform wages (passenger), actual.....	\$14,325	\$8,290	\$6,035
Power (1919 costs).....	42,500	21,120	20,620
Maintenance of cars (estimated).....	8,500	6,300	2,200
Tie renewals (estimated).....	8,750	7,700	1,050
	\$74,075	\$43,410	\$29,905
Increase in lighting business per year (actual).....			18,000
Increase in net earnings.....			\$47,905

STATISTICS

	Old System	New System
Passenger car-miles.....	280,000	280,000
Freight car-miles.....	20,000	20,000
Total kilowatt-hours.....	2,131,000 kw.-hr.	1,408,000 kw.-hr.
For passenger cars.....	1,680,000 kw.-hr.	700,000 kw.-hr.
For freight cars.....	108,000 kw.-hr.	108,000 kw.-hr.
For light and power.....	343,000 kw.-hr.	600,000 kw.-hr.
Kw.-hr. per car-mile (passenger).....	6.0	2.5
Kw.-hr. per car-mile (freight).....	5.4	5.4
Maintenance per car-mile.....	2.83 cents	2.1 cents
Track and roadway maintenance per car-mile.....	5.3 cents	4.95 cents
Tie spacing.....	2 ft., 0 in.	3 ft., 0 in.
Platform wages per hour, per man.....	50 cents	58 cents

As a result of this expenditure the company has increased the net return about \$47,905 per year, and this figure does not make allowances for 1920 coal prices. (It actually cost the company \$66,000 in 1920 to produce power.) The figure for power in the column "Old System" in the table above is based on 1919 costs.

The saving in platform wages given above is the actual saving obtained after allowing the operators of the safety cars an increase of 8 cents per hour. The saving in power is the actual difference between what it cost in 1919 to produce power in the company's old plant and the cost to purchase their requirements in 1921.

The saving in maintenance is estimated on the basis of a somewhat higher figure than is actually being obtained for similar cars on the Cincinnati, Lawrence-



CLOSE UP OF FARE BOX AND ZONE TICKET BOX

burg & Aurora Traction Company after three years of operation, the actual cost on that railway being 1.45 cents as compared with the above estimate of 2.1 cents.

The saving in tie renewals is based on only 12 per cent of the actual cost of 7,000 ties per year at \$1.25 each. With the light-weight car, however, the traction company is now spacing ties at 3-ft. centers, as compared to 2-ft. formerly. This means that eventually the tie renewals will actually be reduced about 40 per cent, although this latter figure will not be reached for some three or four years to come. This saving is not theo-

retical. It has actually been determined from results obtained by the Union Traction Company, Nashville, Tenn., which has operated similar weight cars for about fifteen months, and the Cincinnati, Lawrenceburg & Aurora Traction Company, Cincinnati, which has operated them for three years.

FARE COLLECTION METHOD

The collection of fares at first seemed rather complicated, but has really worked out very satisfactorily. There are twenty-two zones, some of which overlap, and it seemed quite a task to work out a plan where one



ARCH-BAR TRUCKS USED ON LIGHT-WEIGHT, ONE-MAN INTERURBAN CARS

man could handle the situation promptly and efficiently. The system adopted is as follows:

A standard Cleveland fare box is used and all fares are collected pay-as-you-enter. The passenger deposits his fare, either cash, regular ticket or commutation ticket, in the fare box and is presented with an identification ticket (hat check), bearing the number of the zone to which he is entitled to ride. Upon reaching his destination he deposits this identification ticket in the box. Should the zone in which the passenger is alighting not correspond with the number on the ticket the operator calls his attention to this and requests any additional fare that may be due.

The zones are numbered from 1 to 22 from the Madisonville end toward Blanchester, and these numbers are the same, regardless of the direction the car is going.

The identification ticket is 2 in. long x 3 in. wide, with a large zone number printed on both sides so it can easily be read, regardless of how it falls in the fare box. Smaller figures are also printed along the edge of the identification ticket, and, in the case of a cash fare, the number corresponding to the zone in which the passenger boards the car is punched out. These numbers are not punched in case of a ticket fare. For example, a passenger boards a car at Madisonville (Zone 1) and deposits cash fare to ride to Milford (Zone 7). The operator punches out 1 in the small figures of a No. 7 zone ticket. If the passenger deposits a regular or commutation ticket, however, no punch mark is necessary, and he is simply given a Zone 7 ticket unpunched.

It is interesting to note that so far as is known not a single instance of over-riding has been attempted in the four months that the cars have been operated.

When service with the new cars and new fare collection system was started off, two men were used for about forty-five days to allow the operators, as well as the public, to become thoroughly acquainted with the operation. Since that time the cars have been running just as successfully with one man; in fact, most of the operators state that they prefer the one-man operation and responsibility.

Railway Valuation in Connecticut—II*

Development and Application of "Unit-of-Construction" Method of Appraisal in Valuing Large Railway System

BY ARCHER E. KNOWLTON
Instructor in Electrical Engineering, Yale University

IN THE previous article several arguments were advanced in favor of a quick and inexpensive appraisal of utility property and it was suggested that the greater saving in time and money could probably be effected in dealing with the "outside plant." In both surface construction and overhead electric construction there is presented a peculiar combination of practical uniformity for stretches of more or less length and, at the same time, wide diversity between the characteristics of even consecutive stretches. The engineers (E. I. Rudd, J. P. Wadhams and the writer) who appraised the street railways of Connecticut for the Public Utilities Commission of that state decided to ascertain the value of the extended property as far as possible by setting up an appropriate number of types of construction for track and paving, contact system, feeders, telephones and signals, transmission lines and bonding and then applying these types in "yardstick" fashion to those properties. It was recognized, of course, that occasional irregularities would not conform to these types, but it was not anticipated that the total value of the irregularities would be great enough to invalidate the results obtained by applying the type costs.

LOW-VOLTAGE DISTRIBUTION SYSTEM

In investigating the possibility of applying the unit-of-construction method of appraisal to the contact-system, it was quickly ascertained that the character of the highway or community, the type of service provided, and the presence of other utilities' wire circuits were the ruling factors in determining the type of contact construction employed by the street railway company. With the exception of the third item, these factors are usually found to continue constant for sufficient distance to result in practical uniformity of the railway construction for distances of several hundred feet. It was estimated that an observer on an inspection car could probably note the character of construction and status of pole ownership in the various sections and, in addition, identify the points of change in about one-sixth of the time required for two or three men to walk the same section and tally in detail every item of physical property. This estimate was not irreconcilable with the actual experience; the 480 miles of route were covered

IN LAST week's issue Mr. Knowlton presented the arguments which led the Public Utilities Commission of Connecticut, and its engineers, to adopt what they called a "practical, business-like valuation" of the electric railways of the state and also some details of how the "non-outside-plant" accounts were treated.

In this issue, the details of the "unit-of-construction" or "yardstick" method of appraisal are described and the method justified. It was by the use of this method, more than any other one item, that made possible this valuation of more than fifty million dollars' worth of property at a cost of approximately \$10,000 to the state and not to exceed that sum to the company. The time consumed in this whole valuation was less than six months and even during this period the engineers had many regular duties to attend to besides the valuation

—EDITORS.

in about sixteen days and the speed of travel gave ample time to note all necessary features of feeder system, telephones and signals as well as of the contact system. It will be noticed that no reference is made to measurements of lengths in the field. Three principal office sources for such information were available and practically no field measurements were necessary. The company's mileage maps gave, to the nearest thousandth of a mile, the distances from the traffic center to switching points of turnouts, special trackwork and sidings,

to town lines, railroad crossings and the line termini. Track and paving sheets prepared and maintained by the company's engineer of maintenance of way gave much detail on rail, paving and ballast and often the points of transition coincided with those for the overhead construction for which no lists were available. Finally highway maps of the state were of aid in other instances.

Before proceeding to establishment of the fundamental types of contact construction, it is necessary to touch upon the extensive practice of wire companies in Connecticut as to joint use and joint ownership of wood poles. One of the joint occupants is agreed upon as the builder and custodian of the line; it shall keep an accurate record of the cost of the construction and subsequently bill the other joint owners for their proper share of that cost, which includes field labor, materials, vehicles and a percentage increment for engineering and supervision. Analysis of the costs of representative sections of line jointly occupied by the street railway, in some cases built by the railway forces but more often by those of other utilities, led to the adoption of the following ratios in value to the railway company between solely owned and occupied wood poles and those jointly owned and occupied:

	Per Cent
Solely owned pole.....	100
One-half interest in two-party pole.....	62½
One-third interest in three-party pole.....	50
One-fourth interest in four-party pole.....	33½

The existing cases of permit and rental attachments were treated as joint ownership cases on the assumption that they would practically balance by reciprocity.

As for the size of trolley wire to use in setting up the types, examination of one representative division showing the usual proportions of business district, residential, suburban and rural mileage resulted in an average size of 0.453 lb. per foot. This figure was used even though it is not a commercial size, and the costs of wire, ears, etc., were obtained by interpolation.

*In two parts. Many data and supporting figures for the electrical part of the appraisal treated in this installment are given in greater detail than possible here in a thesis Mr. Knowlton has just presented to the faculty of the Graduate School, Yale University. Complete data are of course on file at the office of the commission in Hartford.

FIG. 1—COST OF SPAN CONSTRUCTION, IRON POLES, DOUBLE TRACK

Type	Cost of SSID Poles	Plus Per Cent of SSID Poles	Plus Part Cost of SSID Poles	Cost 1,000 Ft. SSID Less Poles	Cost of Joint Construction	
					Per 1,000 Ft.	Per Mile
SSID	\$685.00	100.0	\$685.00	\$257.32	\$942.32	\$4,975.54
SJ ₂ ID	62.5	62.5	428.13	.....	685.45	3,619.17
SJ ₃ ID	50.0	50.0	342.50	.....	599.82	3,167.05
SJ ₄ ID	33.33	33.33	228.33	.....	485.65	2,564.23
SSJ ₂ ID	81.25	81.25	556.56	.....	813.88	4,297.29
SSJ ₃ ID	75.0	75.0	513.75	.....	771.07	4,071.25
SSJ ₄ ID	66.67	66.67	456.67	.....	713.99	3,769.87

Per Span						Per 1,000 Ft. Section						
No.	Each	All	F.C.W.*	A.I.†	Total	Item	Size	Quan.	F.O.B.	F.C.W.	A.I.	Total
2	\$24.10	\$48.20	\$3.10	\$17.20	\$68.50	Iron poles (caps, gds, conc., S-W.) 934 lb.....	No. 3-30 ft.	20	\$482.00	\$31.00	\$172.00	\$685.00
2	.19	.38	.....	.....	.....	Pole bands.....	5 in.	20	3.80	.....	.....	.....
50 ft.	.009	.45	.....	.....	.....	Span wire.....	1/8 in.	500 ft.	4.50	.....	.....	.....
4	.16	.64	.....	.....	.....	Wood strain insulators (no clevis).....	9 in. E	40	6.40	.....	.....	.....
2	.368	.74	.....	.....	.....	Straight line hangers.....	.....	20	7.40	.....	.....	.....
.....	.....	2.21	.11	1.00	3.32	Span assembled and installed.....	.....	.....	22.10	1.10	10.00	33.20
.....	.39	.....	.....	.....	.....	Strain plate.....	.....	2	.78	.....	.....	.....
.....	.21	.....	.....	.....	.....	Wood strain insulators (with clevis).....	.....	16	3.36	.....	.....	.....
.....	.009	.....	.....	.....	.....	Anchor wire.....	.....	600 ft.	5.40	.....	.....	.....
.....	.....	.....	.....	.....	.....	Strain complete.....	.....	.....	9.54	.48	2.25	12.27
.....	.....	.....	.....	.....	.....	Trolley wire.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	Ears.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	Suspended trolley wire.....	.....	2,000 ft.	.....	.....	.....	175.85
.....	.....	.....	.....	.....	.....	Truck or line car, 4 days on poles 0.8 days on wire.....	.....	4.8	.....	.....	7.50	36.00
.....	.....	.....	.....	.....	.....	Finished construction.....	.....	1,000 ft.	.....	.....	.....	\$942.32

In adopting the types and the associated symbolic notation, the four aspects of contact construction which determine its character and cost are, with the codes for use in the field inspection:

A. Suspension

B. Ownership of Poles

C. Pole Material

{ Bracket = B

{ Span = S

{ Sole = S

{ Joint = J

{ Wood = W

{ Iron = I

{ Concrete = C

D. Number of Tracks

{ Single = S

{ Double = D

The fundamental combinations of these elements were taken to be the following:

1. Bracket construction, Sole ownership, Wood poles, Single track = BSWS

2. Bracket construction, Sole ownership, Wood poles, Double track = BSWD

3. Bracket construction, Sole ownership, Iron poles, Single track = BSIS

4. Bracket construction, Sole ownership, Center Iron poles, Double track = BSID

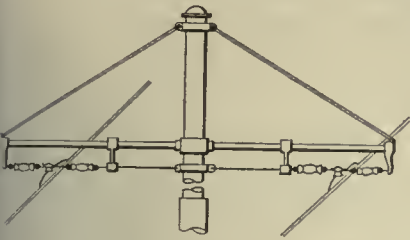
FIG. 2—COST OF SPAN CONSTRUCTION, WOOD POLES, SINGLE TRACK

Type	Cost of SSWS Poles	Plus Per Cent of SSWS Poles	Plus Part Cost of SSWS Poles	Cost of 1,000 ft. SSWS Less Poles	Cost of Joint Construction	
					Per 1000 Ft.	Per Mile
SSWS	\$158.80	100.00	\$158.80	\$156.51	\$315.31	\$1,664.84
SJ ₂ WS	62.50	62.50	99.25	255.76	1,350.41	.....
SJ ₃ WS	50.00	50.00	79.40	235.91	1,245.60	.....
SJ ₄ WS	33.33	33.33	52.93	209.44	1,105.84	.....
SSJ ₂ WS	81.25	81.25	129.03	285.54	1,507.65	.....
SSJ ₃ WS	75.00	75.00	119.10	275.61	1,455.22	.....
SSJ ₄ WS	66.67	66.67	105.87	262.38	1,385.37	.....
SJ ₂ JWS	56.25	56.25	89.33	245.84	.....	.....
SJ ₃ JWS	47.90	47.90	76.07	232.58	.....	.....
SJ ₄ JWS	41.66	41.66	66.06	222.57	.....	.....

Per Span						Per 1,000 ft. Section						
No.	Each	F. O. B.	F.C.W.	A.I.		Item	Size	Quan.	F. O. B.	F.C.W.	A.I.	Total
2	\$3.25	\$6.50	\$2.68	\$6.70	\$15.88	Chest. poles, shaved, treated, set.....	30 ft.	20	\$65.00	\$26.80	\$67.00	\$158.80
2	.095	.19	.02	.40	.....	Eyebolts, nuts, washers.....	3/4 in. x 16	20	1.90	.24	4.00	.....
50 ft.	.009	.45	.....	.....	.....	Span wire.....	1/8 in.	500 ft.	4.50	.....	.....	.....
2	.16	.32	.05	.60	.....	Wood strain insulators (no clevis).....	9 in. E	20	3.20	.50	6.00	.....
1	.368	.368	.....	.....	.....	Straight line hangers.....	.....	10	3.68	.....	.....	.....
.....	.....	1.328	.07	1.00	2.402	Span assembled and installed.....	.....	.....	13.28	.74	10.00	24.02
.....	.39	.39	.02	.....	.....	Strain plate.....	.....	1	.39	.....	.....	.....
.....	.21	.....	.....	.....	.....	Wood strain insulators (with clevis).....	9 in.	16	3.36	.....	.....	.....
.....	.009	.....	.....	.....	.....	Anchor wire.....	1/8 in.	600 ft.	5.40	.....	.....	.....
.....	.....	.....	.....	.....	.....	Strain complete.....	.....	.....	9.15	.45	2.00	11.60
lb.	.162	.....	.01	.172	.....	Trolley wire.....	.....	1,000 ft.	453 lb./ft.	4.53	.....	.....
1	.26	.....	.01	.27	.....	Ears.....	.....	11	2.86	.11	.....	.....
ft.	.....	.....	.....	.007	.....	Suspended trolley wire.....	.....	1,000 ft.	76.25	4.64	7.00	87.89
.....	.....	.....	.....	.....	.....	Truck or line car, 4 days on poles 0.4 days on wire.....	.....	.....	.....	.....	7.50	33.00
.....	.....	.....	.....	.....	.....	Finished construction.....	.....	1,000 ft.	.....	.....	.....	\$315.31

*F.C.W. indicates Freight, Cartage and Warehousing. †Indicates Assembly and Installation.

FIG. 3—COST OF BRACKET CONSTRUCTION, CENTER IRON POLES, DOUBLE TRACK



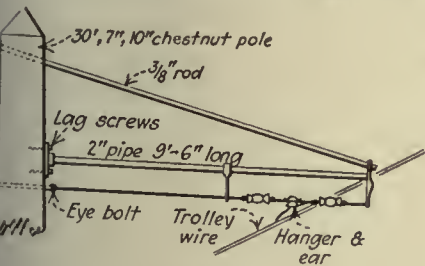
Type	Cost of BSID Poles	Plus per Cent. of BSID Poles	Plus Part Cost of BSID Poles	Cost of 1000 ft. BSID Less Poles	Cost of Joint Construction	
					Per 1000 ft.	Per mile
BSID BJ ₂ ID BJ ₃ ID BJ ₄ ID	\$342.50	\$100.0 62.5 50.0 33.33	\$342.50	\$295.27	\$637.77	\$3,367.43

Per Poles						Per 1,000 ft. Section						
No.	Each	F.O.B.	FCW	A. I.	Total	Item	Size	Quan.	F.O.B.	FCW	A. I.	Total
1	\$24.10	\$24.10	\$1.55	\$8.60	\$34.25	Iron poles (caps, gds., conc. & S. W.)	No. 3-30 ft.	10	\$241.00	\$15.50	\$86.00	\$342.50
2	.19	.38				Pole Baods.	5 in.	20	3.80			
2	1.26	2.52				Bracket arm, middle and end casting.	2 in. x 9.5 ft.	20	25.20			
1	.20	.20				Pole casting.	5 in.	10	2.00			
2	.35	.70				Over suppt. rod, thrd. nuts, washers.	3/4 in. x 11 ft.	20	7.00			
4	.16	.64				Wood strain insulators.	9 in. E	40	6.40			
30 ft.	.009	.27				Span wire.	3/8 in.	300 ft.	2.70			
2	.368	.73				Straight line hanger.	1/2 in.	18	6.57			
		5.44	.27	2.00	7.71	Brackets complete, less two hangers.			53.67	2.70	20.00	76.37
						Strain complete.		2				15.90
						Suspended trolley wire.	2,000 ft.					174.50
						Truck or line car						
						3 days on poles						
						0.8 days on wire.					7.50	28.50
						Finished construction.		1,000 ft.				\$637.77

5. Span construction, Sole ownership,
Wood poles, Single track
6. Span construction, Sole ownership,
Wood poles, Double track
7. Span construction, Sole ownership,
Iron poles, Single track
8. Span construction, Sole ownership,
Iron poles, Double track
- = SSWS
= SSWD
= SSIS
= SSID
- Differences in cost between the rigid and flexible

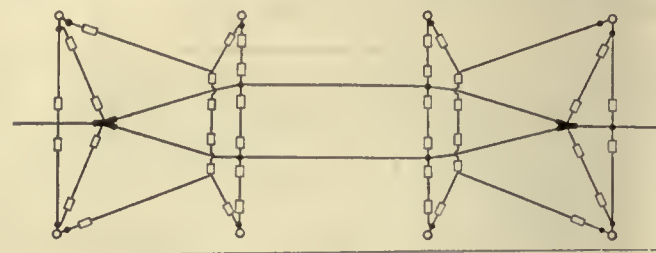
bracket and between double brackets on center poles and long brackets on side-location poles for double track were insignificant and therefore ignored. The cost of a thousand-foot section of each one of these types was then tabulated, the arrangement conforming to the actual subdivision of the work during assembly and construction. Figures 1 to 4 show the tabulated costs for some of the types. The table in the upper right hand

FIG. 4—COST OF BRACKET CONSTRUCTION, WOOD POLES, SINGLE TRACK



Type	Cost of BSWS Poles	Plus Per Cent. of BSWS Poles	Plus Per Cent. Cost of BSWS Poles	Cost of 1000 ft. BSWS Less Poles	Cost of Joint Construction	
					Per 1000 ft.	Per Mile
BSWS BJ ₂ WS BJ ₃ WS BJ ₄ WS	\$79.40	100 62 1/2 50 33 1/3	\$79.40 49.60 39.70 26.47	\$151.69	\$231.09 201.29 191.39 178.16	\$1220.15 1062.81 1010.54 940.68

Per Bracket						Per 1,000 Ft. Section						
No.	Each	All	F.C.W.	A. I.	Total	Item	Size	Quan.	F.O.B.	F.C.W.	A. I.	Total
1	\$3.25	\$3.25	\$1.34	\$3.35	\$7.94	Chest. poles (shaved, treated, set).....	30 ft.	10	\$32.50	\$13.40	\$33.50	\$79.40
1	1.395	1.395				Bracket arms plus castings.....	2in.x9.5ft.	10	13.95			
1	.089	.089				Eyebolts and washers.....	1/2x12 in.	10	.89			
2	.015	.03				Lag screws.....	1/2x4 in.	20	.30			
2	.16	.32				Wood strain insulators (no clevis).....	9 in. E	18	2.88			
15	.009	.135				Span wire.....	3/8	150ft.	1.35			
1	.368	.368				Straight line hanger.....	1/2	9	3.31			
1	.35	.35				Over suppt. rod (thrd. nuts, washers).....	1/2x11 ft.	10	3.50			
		2.687	.13	1.10	2.917	Brackets complete (less one hanger).....		10	26.18	1.31	11.00	38.49
	.39					Strain plates.....	15 in.	1	.39			
	.21					Wood strain insulators (with clevis).....	9 in. E	8	1.68			
	.009					Anchor wire.....	3/8	400 ft.	3.60			
						Strain complete (one in 1,000 ft.).....			5.67	.28	2.00	7.95
	.162		.01		.172	Trolley wire, 1,000 ft.....		453lb.	73.39	4.53		
	.26					Ears.....		9	2.34	.09		
				.007		Suspended trolley wire.....			75.63	4.62	7.00	87.25
						Truck or line car, 2 days on poles, 0.4 days on wire.....		2.4			7.50	18.00
Finished construction.....							1,000 ft.....		\$231.09			



Item	Size	Quantity	Each, F.O.B.	Total, F.O.B.	F.C.W.	A. I.	Total
Chestnut poles.....	30'	8	3.25	26.00	10.73	26.80	\$63.52
Eyebolts, nuts, washers.....	1/2 x 12"	12	0.089	1.07	0.05	.....	.....
Backbone, 7 strand.....	1/4"	480'	0.006	2.70	.90	.....	.....
Pull-off, 7 strand.....	1/4"	450'	0.0072	3.24	1.71	.....	.....
3-bolt clamps.....	.....	.....	.....	.....	.....	.....	.....
Wood-strain insulators.....	.....	40	.16	6.40	.....	.....	.....
Straight line hangers.....	9" E	6	.368	2.21	.76	.....	.....
Double-curve pull-overs.....	.....	4	.444	1.77	.....	.....	.....
V-frogs.....	.....	2	2.50	5.00	.....	.....	.....
Turnout (less trolley and ears).....	.....	.....	.....	22.39	3.42	22.70	48.51
Trolley wire, 700 ft.....	.....	317 lb.	.....	51.35	3.17	.....	.....
Ears.....	.....	10	.26	2.60	.10	.....	.....
Suspended trolley wire.....	.....	.....	.....	53.95	3.27	6.30	63.25
Truck or line ear, 1 day.....	.....	.....	.....	.....	.....	.....	7.50
Finished turnout.....	.....	.....	.....	.....	.....	.....	\$183.50
Detail of labor on spans, 102 splices at \$0.15 = \$15.30							
2 frogs at 1.50 = 3.00							
10 spans at .20 = 1.60							
12 eyebolts at .20 = 2.40							
\$22.70							

FIG. 5—DIAMOND TYPE TURNOUT—SPAN CONSTRUCTION

corner shows the values allowed for joint pole use, incorporating the ratios previously referred to. Of course where poles are jointly used on one side and solely owned and occupied on the other in the case of span construction, the average for the corresponding pole values applies. A similar average is taken where the poles may be iron on one side and wood on the other. Where double trolley wire was in use over single track, the extra cost (1910-1915 prices were employed throughout the entire valuation) were practically \$100 per thousand feet. Proper adjustments were also made for cases where span wires were attached to buildings or bridge structures.

Having established these types, a trial of reliability was made by applying the proper types to a 2-mile rural line which the company had inventoried in great detail. The company on its own pricing claimed a value of \$2,643.19 and the result of applying the types was \$2,629.50. Some will be inclined to claim that the agreement is too good to be convincing.

The actual length of turnouts shorter than 400 feet was ignored, the value assigned being that for the average 300-ft. turnout; there is also little difference in cost between diamond and jackknife turnouts of that length as will be seen by reference to Figs. 5 and 6. Longer turnouts were treated as double track with turnout ends.

In dealing with the overhead special work, it was recognized that there would be appreciable deviation from right angles at intersections, varying length of approach and curve, unsymmetrical pole locations, etc., but the errors in averaging these factors and even in ignoring joint use of poles in connection with the special work could not accumulate to a significant total. In the case of some kinds of special work the main line

mileage for the adjacent tangent construction was taken through the special work, the value of which is then the excess over tangent construction. In other cases the mileage of tangent construction was taken to and from the special work because the special work involved considerable complexity and extra poles for its support.

With the types and symbols thus adopted for the contact system (and also signals, telephones and feeders), the next move was the field inspection for the purpose of listing the construction. An inspection car with an observation end was used, so routed as to keep that end forward as much as possible, and so scheduled as to permit stops for special inspections when deemed necessary. All sorts of identifying notations were made for recording the points where the construction changed in some respect — street intersections, pole numbers, bridges, and even a letter on an enlarged state topographical map when other means failed. The following few lines will show the general nature of the simple field notes necessary to list by symbols and identify the locations of the various kinds of overhead construction:

Fairfield Avenue Line		Distribution	Feeders
(Two blocks HTS; 1 to T.O. then 1 to end of line; both on 2-pin arms)		.....	.....
End of line to White St. T.O. (T.O. = 275 ft.)		SSIJ ₂ WS	0
White St. T.O. to C (Map 21)		SSIJ ₂ WS	0
C to Fairfield Ave., double track		SSIJ ₂ WS	1
On double track to New Britain Ave. Jnc.		SSIJ ₂ WD	1

The point C was noted as the end of the feeder. The parenthesis refers to a hand-thrown signal and circuit. The poles were solely owned iron ones on one side and three-party joint wood poles on the other side.

The form used for listing and totaling the contact system, feeders, special work and bonding is shown in Figure 7. It is felt that this form will give ample evidence of the possibility of ascertaining with little effort



Item	Size	Quantity	Each, F.O.B.	Total, F.O.B.	F.C.W.	A. I.	Total
Chestnut poles.....	30'	10	3.25	32.50	13.40	33.50	\$79.40
Eyebolts, nuts, washers.....	1/2 x 12"	14	0.089	1.25	0.06	.....	.....
Backbone, 7 strand.....	1/4"	120'	0.006	0.72	0.24	.....	.....
Pull-off, 7 strand.....	1/4"	650'	0.0072	4.68	2.47	.....	.....
3-bolt clamps.....	.....	8	0.20	1.60	.....	.....	.....
Wood strain insulators.....	9" E	26	.16	4.16	.....	.....	.....
Straight line hangers.....	.....	8	.368	2.94	.....	.....	.....
Single-curve pullover.....	.....	4	0.41	1.64	0.72	.....	.....
Right-hand frog.....	.....	1	2.00	2.00	.....	.....	.....
Left-hand frog.....	.....	1	2.00	2.00	.....	.....	.....
Turnout (less trolley and ears).....	.....	.....	.....	20.99	3.49	19.85	44.33
Trolley wire, 650 ft.....	.....	294 lb.	0.162	47.63	2.94	.....	.....
Ears.....	.....	12	0.26	3.12	3.12	.....	.....
Suspended trolley wire.....	.....	.....	.....	50.75	3.06	4.55	58.36
Truck or line ear, 1 day.....	.....	.....	.....	.....	.....	.....	7.50
Finished turnout.....	.....	.....	.....	.....	.....	.....	\$189.50
Detail of labor on spans, 83 splices at \$0.15 = \$12.45							
2 frogs at 1.50 = 3.00							
8 spans at .20 = 1.60							
14 eyebolts at .20 = 2.80							
\$19.85							

FIG. 6—JACK-KNIFE TYPE TURNOUT—SPAN CONSTRUCTION

[illegible]

the capital investment in the electrical construction for any portion of a given street-car line, of differentiating between distinctly city and rural lines, of obtaining totals for portions of the entire system not necessarily coterminous with the company's divisions as established for operating purposes, and finally of identifying at any time the location of each bit of outside plant construction and the value assigned to it. Granting also the propriety of separating the feeder and cross arms from the contact wire and poles as will be described, the method of listing also keeps distinct from the actual distribution (of localized value) the feeder system which functions primarily to supply not so much the section valued but rather the more remote sections.

FEEDER SYSTEM

The Interstate Commerce Commission classification has "Poles and Fixtures" in one account and "Distribution System" in another, but this separation interferes with an estimate of reproduction cost on a unit-of-construction basis. "Fixtures" include the cross-arms and braces and these are associated with the feeders or signal circuits and not with the contact system. "Poles," on the other hand, are necessary for the contact system even when feeders are absent. Except where the feeders follow an independent route, poles have already been included with the contact system. Cross-arms will thus appear in conjunction with the feeders, enough extra pins being allowed in excess of the feeder requirements to provide space for such signal circuits as appear. Of course feeders may be of aluminum as well as copper, underground or submarine as well as aerial, negative feeders may be used in electrolysis mitigation, many combinations of cross-arm sizes and feeder sizes are to be found, and there are always such accessories as feed taps, circuit breakers, knife switches and section insulators, lightning arresters,

meters, etc., but no difficulty was found in dealing with these variations. The company had a complete set of feeder maps which were accurate or could readily be made so and these maps indicated the number and sizes of all feeders, the location of changes in number and sizes, the approximate location of feed taps and the accessories. In a few instances the actual measured length of a feeder was recorded, but in general the lengths were obtained from the mileage maps and the track and paving sheets already mentioned.

The following will indicate the allowances for cross-arm sizes with given numbers of feeders, the spare pins leaving adequate provision for the few signal and telephone circuits:

One to four feeders
Five and six feeders
Seven to twelve feeders
Twelve to eighteen feeders, etc.

One four-pin arm
One six-pin arm
Two six-pin arms
Three six-pin arms, etc.

Allowing for double-arming at corners and dead-ends the cost of four-pin arms per 1,000 ft. of feeder circuit was \$14 and for six-pin arms \$17. Insulators cost about \$2 per 1,000 ft., as an average for all sizes of feeders.

No further progress toward reduction to types could be made than thus to standardize on cross-arm sizes for certain numbers of grouped feeders, the large number of possible combinations pointing rather toward a tabulation of individual feeder costs which could flexibly be applied to any selection likely to be encountered. Table I shows these costs per thousand feet. Two illustrations are offered as showing how this table was used for combinations not directly tabulated.

1. Seven 4/0 plus two 750,000 c.m. feeders.
2. Eight 600,000 c.m., twelve 500,000 c.m., five 4/0.

The combination (1) is treated as two groups (of three 4/0 and one 750,000) each at \$960 with an extra 4/0; but two six-pin arms would be used, therefore it is necessary to increase the allowance by \$6, the difference

TABLE I—COSTS PER 1,000 FT., INSTALLED, OF FEEDER COMBINATIONS

	+ 0	+ 1 2/0	+ 1 4/0	+ 1 250M	+ 1 300M	+ 1 600M	+ 2 500M	+ 3 500M	+ 1 600M	+ 1 750M	+ 1 1000M
1-4/0	160	257		345	379	508	857	1206	571	667	822
2-	307	404		492	526	656	1005	1357	718	814	969
3-	453	550	599	638	672	802	1154	1503	864	960	1115
1-250 M	199	250	395		418	547	896	1245	610	706	861
2-	384	481	530		603	733	1082	1434	795	891	1046
3-	570	666	716	755	789	919	1271	1620	981	1077	1232
1-300 M	233	330	379	418		581	930	1279	644	740	895
2-	451	548	597	636		800	1149	1501	862	958	1113
3-	670	767	816	855	889	1090	1371	1720	1081	1177	1327
1-500 M	362	459	508	547	581				774	870	1025
2-	711	808	857	896	930				1123	1218	1372
3-	1059	1156	1206	1245	1279				1471	1566	1721
4-	1408	1508	1557	1596	1630				1822	1913	2072
5-	1760	1860	1909	1948	1982				2174	2270	2425
6-	2106	2225	2274	2313	2347	2474	2823	3171	2539	2635	2790
1-600 M	425	522	571	610	644	774	1123	1471		932	1087
2-	836	933	982	1021	1065	1185	1534	1886		1343	1498
3-	1247	1344	1393	1432	1466	1596	1948	2297		1764	1909
4-	1658	1758	1807	1846	1880	2010	2362	2725		2168	2323
5-	2072	2169	2218	2267	2291	2421	2767	3136	2483	2579	2724
1-750 M	621	618	667	706	740	870	1219	1568	932		1183
2-	1028	1125	1174	1213	1247	1377	1726	2078	1439		1690
3-	1535	1632	1681	1720	1764	1834	2236	2585	1946		2197
4-	2549	2649	2698	2737	2771	2901	3250	3616	2963		3214
5-	3062	3159	3208	3247	3281	3411	3777	4126	3473	3569	3724
1-1000 M	676	773	822	861	895	1025	1374	1723	1087	1183	
2-	1338	1435	1484	1523	1567	1687	2036	2388	1749	1845	
3-	2000	2097	2146	2185	2219	2349	2701	3050	2411	2507	
4-	2662	2762	2811	2850	2884	3014	3363	3729	3076	3172	
5-	3327	3424	3473	3512	3546	3676	4042	4391	3778	3834	3989
No cross-arm; with Insulator		97	146	185	219	349	698	1047	411	507	662
No cross-arm or ins.		95	144	183	217	347	694	1041	409	505	660

	1/0	3/0	350M	400M	700M	1" Al.	1.21" Al.	1.24" Al.
No cross arm; with insulator	79	121	252	284	476	292	493	416
No cross arm or insulator	77	119	250	282	473	290	491	414

between the cost installed of six-pin arms and four-pin arms in the thousand feet. Further the odd 4/0 feeder value is taken as \$146, tabulated under "no cross-arm; with insulators," because this feeder will appear on one of the unoccupied pins of the six-pin arms. The total per thousand feet of this combination is \$2,072. Group (2) is handled as:

Four 600,000 + one 4/0.....	\$1,807
Four 600,000 + one 4/0.....	1,807
Nine 500,000.....	3,171
Three 4/0 + three 500,000.....	1,503
All on five six-pin arms (per 1,000 ft.).....	\$8,288

Above the broken line in each block of the table the total number of feeders for each combination calls for a four-pin cross-arm; between the broken and dot-and-dash line a six-pin arm; below the dot-and-dash line two six-pin arms. It should be noted that the portions of the above totals which represent the assumed cross-arms amount to percentages ranging from 1.2 per cent to 1.7 per cent and that any error in the above assumption as to number and size of cross-arms would therefore be well within 1 per cent of the over-all value.

The feeder maps were spot checked as to feeder sizes and the location, number and types of such accessories as circuit breakers, section insulators, knife switches, feed taps, etc. Bracket and span feed taps were priced separately, that one being assigned which corresponded to the contact construction in the section where it appeared. A single average length of feed wire was

used with all circuit breakers and knife switches to allow for the vertical runs.

The 147 miles of circuit are shown schematically in Fig. 8. Although all this mileage is operated at 11,000 volts, three-phase, 25 cycles, some lines are insulated for 22,000 and 33,000 working volts. The fifteen different types of pole tops found are shown in Fig. 9. The conductors are of either copper (No. 4, No. 2, or 2/0) or aluminum (1/0, 2/0 or 4/0). Each of the lines, ranging from 8 to 30 miles in length, was found to be of a high degree of uniformity of type either throughout the entire length or for at least a quarter of the distance. This meant that this portion of the street railway property lent itself very advantageously to the unit-of-construction method of estimation first developed for the distribution system.

The lines were built entirely on wooden poles and these poles would at any point be the same whatever the character of pole-top construction or the character of insulators or conductors.

On the other hand, the pole-top construction would be practically independent of poles and conductors. The insulators seem to be more intimately related to the conductors than to the cross-arms. In view of these considerations the analysis was aimed toward a study independently of poles, pole tops and circuits. With the poles

in place any one of the established set of types of pole tops would then be erected on these poles to support any type of circuit existing on the system.

The company had on file route maps of the lines and these were found to be accurate as to lengths of lines and numbers of poles, location of special crossings, etc., but did not give the type of pole top nor the height of the individual pole. It was therefore decided to make a quick field inspection to determine the number of poles

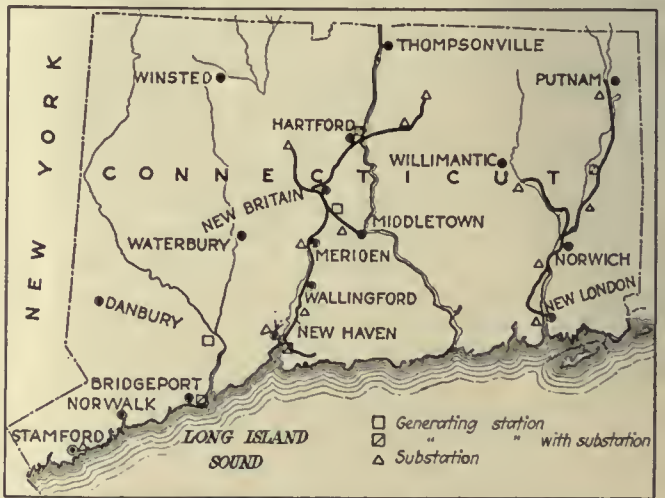


FIG. 8—TRANSMISSION SYSTEM, POWER PLANTS AND SUBSTATIONS

of each size, the number of double cross-arms (at angles, etc.), the number of special crossings (over railroads, other wire lines, etc.), the number of H-frames (at dead-ends and angles), of anchor guys, braces, head guys, and stubs. At the same time the points of transition from one type of pole top or circuit to another could be noted as well as the few irregularities not covered by type treatment.

It was found that the number of poles per thousand feet averaged 9.57, giving an average span length of 104.51 feet, and that the poles were distributed as to size as follows, 10 per cent being set in rock, the remainder in medium earth:

Pole Height, Feet	Poles per 1,000 ft.	Per Cent
35.....	2.04	21.27
40.....	5.37	56.17
45.....	1.36	14.25
50.....	.48	5.02
55.....	.18	1.83
60.....	.09	.94
65.....	.04	.42
70.....	.01	.10
	9.57	100.00

The inspection of from 325,000 to 647,080 ft. of line disclosed the frequency of incidental construction to be as follows:

Item	Total	Per 1,000 Ft.
Double cross-arms.....	906	1.40
Special crossings	301	.49
H-frames	18	.26
Anchor guys	663	2.03
Braces	161	.49

Assembly of the various items in these proportions gave the costs per thousand feet of poles and of each of the types of pole tops. The poles and reinforcement amounted to \$211.61 per thousand feet. A thousand feet of "A" pole tops cost \$32.70; of "H," \$75.58, etc. A similar set-up was made for conductors and insulators.

The ten lines having a total circuit mileage of 147 (with overlap of about 6 miles) were valued at \$281,463.61. After adjusting for the overlap, for joint use of poles with trolley contact circuits, and for short sections of cable, the value per mile of single circuit line averages to practically \$1,900.

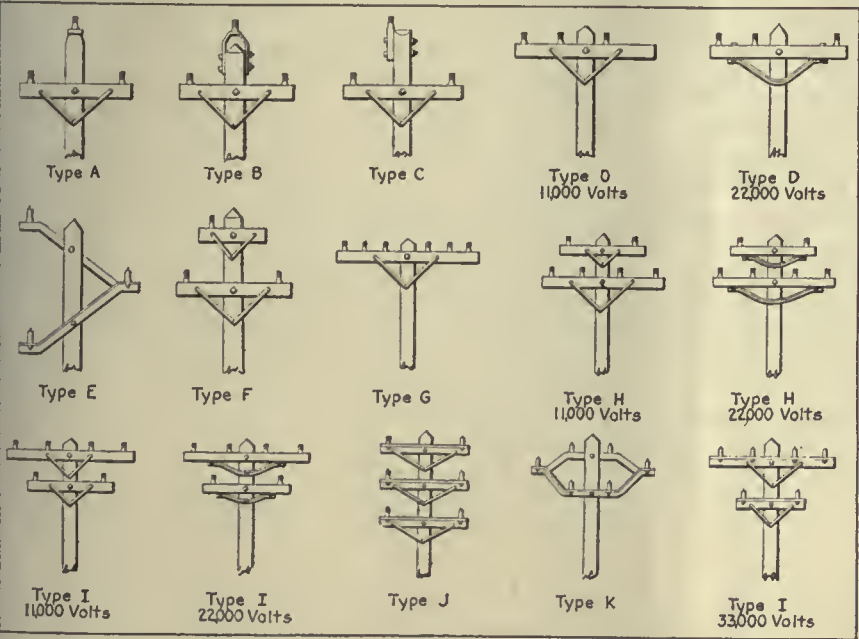


FIG. 9—TYPES OF POLE TOPS USED BY THE CONNECTICUT COMPANY

TABLE II—QUANTITIES OF EXCAVATION AND BALLAST FOR VARIOUS KINDS OF TRACK

Track Excavation		Cubic Yards per 100 Lineal Feet													
Wood Ties	Class Track	Single Track							Double Track						
		9"	8"	7"	6"	5"	4 1/2"	4"	9"	8"	7"	6"	5"	4 1/2"	4"
A	77								150						
B	72	69				61	60		149	143			126	123	
C G J	50	47	44	42	39	37	36		106	100	94	88	82	79	76
D F N	58	56	63	50	47	46	44		123	117	111	106	100	97	94
K M						64	62						135	132	
Side Loc. C G J					25	25	25	25				53	53	53	53
" " D F N					33	33	33	33				70	70	70	70

Paving Excavation

Class Pav. In. Thick	P X 1 9"	P 1 X 1 2 1/2"	K 12"	R 1 T 3 5"	S W 6"	X 2 8"	T Y 1 11"	W 2 4"	P 2 7"	T 2 10"	Pockets Under Rail X 1 Wg	V Z
Single Track	25	7	33	14	17	22	31	11	19	28	1.3	0
Double Track	53	15	70	29	35	47	65	23	41	58	2.7	0

Ballast

	A	A ₂	A ₃ A ₁ A ₀	B	C G J	D F N	K M	Side Location	R.R. Section
Single Track				22.8	0	28.4	45.1	28.4	34
Double Track	46.0	44.2	48.2	48.6	0	60.5	95.7	60.5	66

Ballast Variation - Paving not same thickness as Rail height

	Decrease - Paving Thicker						Increase - Paving Thinner						Pockets under Rail Deduct.
	1"	2"	3"	4"	5"	6"	1"	2"	3"	4"	5"	6"	
Single Track	1.95	3.9	5.9	7.8	9.8	11.7	2.8	5.6	8.4	11.1	13.9	16.7	1.3
Double Track	4.2	8.4	12.7	16.9	21.1	25.3	5.85	11.7	17.6	23.4	29.3	35.1	2.7

Signals, telephones and rail-bonding proved susceptible to the same general reduction to type. Signal and telephone circuits were priced on a thousand-foot basis, no allowance being made for cross-arms since spare pins for these circuits were contemplated in pricing the feeders. Four distinct types of signal devices and four telephone station types were found and the costs of these determined separately from the circuits. Similarly the cost per hundred feet of bonding each length of rail, single or double track with each type of bond, from the short U-type to the long 48 in., was tabulated and applied to each section according to the recorded bonding. It is shown that the bonding of special trackwork required special treatment.

TRACK AND ROADWAY

In attacking the problem of the track and paving costs it was found that the company's engineer of maintenance of way had records which gave in great detail the character of track construction from point to point on the system. It was based on a classification which employed a letter to indicate the nature of sub-foundation and ballast and a numeral to indicate the weight and length of rail, kind of ties and kind of joint. The listing sheets were segregated by divisions, routes and towns and gave to the nearest foot the length of each uniform combination of sub-foundation, ballast, track and paving. The points of change were identified by various methods—names of cross-streets, the approximate distance from

the last named cross-street, special trackwork, railroad crossing, town line, etc. These same sheets have already been mentioned as of considerable value in determining lengths of overhead electrical construction. It has also already been stated that special trackwork was recorded by serial number on individual detailed maps giving all dimensions and such other information as was necessary for pricing purposes. No difficulty was experienced in co-ordinating the special trackwork information with that for tangent track appearing on the track and paving sheets in such a manner as to differentiate wholly between the two as to distances and values.

These records simplified the field work with reference to track to a greater extent, in proportion, than was the case with the electrical outside plant.

To reduce the tangent track construction to a type basis for the purpose of applying the "unit of construction" method of valuation, the classification established by the company was somewhat enlarged to symbolize all

TABLE III—ESTIMATED COST OF 100 LINEAL FEET IN VARIOUS PAVEMENTS
(1910-1915 prices)

Classification	Paving	Cost	
		Single Track	Double Track
A-1	P	541.77	1,046.82
B-2	S	368.07	723.59
C-3	V	209.53	423.17
C-3	X	238.86	485.17
D-4	R	344.92	702.00
F-4	T	295.24	601.79
H-1	P	.....	1,196.46
J-15	R ₁	166.80	337.71
K-2	—	254.58	522.37
M-1	Z	232.77	475.04

the elements involved. The letters adopted and their significances as to foundation and ballast are as follows:

- A

B

C, G, J

E

D, F, N

K, M
- Concrete mat sub-foundation

Telford sub-foundation

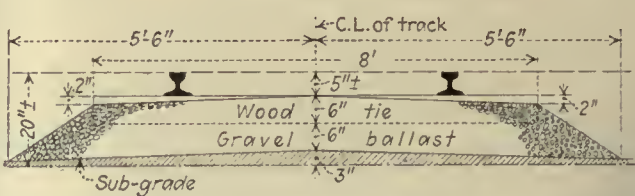
On native material suitable for ballast

On bridge

On sub-foundation of native soil not suitable for ballast, requiring the placing of either gravel or stone ballast. The ballast differentiates between the three letters.

Special types, one a sub-foundation of stone, the other of cinders

An excavation and ballast table (Table II) was first prepared to show the cubic yards of track excavation per hundred lineal feet of track for each combination of sub-foundation, rail height and paving. The costs of excavating for the full depth of track construction and for pavement differ and for that reason the quantities involved are shown separately in the two upper tables of the figure. The same table shows in the third subdivision the varying quantities of ballast involved with the different conditions of sub-foundations and ties. The fourth subdivision (at the bottom of the table) shows corrections to be applied to ballast quantities when the paving and its foundation are not of the same total thickness as the height of the rail. Applying the proper unit prices to the quantities for each kind of track as



ESTIMATED COST OF 100 LINEAL FEET OF SINGLE TRACK				
Item	Unit	Rate	Quantity	Amount
Rail—T 5 in., 80 lb., 33 ft....	Tons	\$35.00	2.381	\$83.34
Splices—Angle 30 in., 6 bolt...	Complete	1.17	6.6	7.72
Spikes.....	Pounds	.02	120	2.40
Ties—native wood.....	Each	.65	50	32.50
Track labor.....	Lineal feet	.35	1.00	35.00
Ballast—gravel.....	Cubic yard	.60	32	19.20
				\$180.16
Contractor's profit.....				8.75
Total.....				\$188.91

FIG. 10—TRACK TABLE FOR TYPE J22

determined by reference to this table and tabulating, the results were then in convenient form for use in assigning costs of excavation and ballast for any combination of track and paving.

Unfortunately the numerals adopted by the company to signify the particular combination of rail section, tie and joints were not uniform for the various letter groups representing the character of sub-foundation and ballast. Thus A-1 means a 9-in., 125-lb., 60-ft. rail on wood ties and a 6-in. concrete mat foundation, the whole ballasted with stone; while C-1 means a 9-in.,

TABLE V—PAVEMENT CLASSIFICATION			
Class	Thickness	Foundation	Surface
P	9 in.	6 in. concrete	2½-3 in. asphalt
R	12 in.	6 in. concrete	Granolithic Block
R ₂	5 in.	Earth	Granolithic Block
S	6 in.	Macadam	Macadam
T	11 in.	6 in. concrete	Brick
V	.....	Earth	Earth
W	6 in.	6 in. concrete	6 in. concrete
W ₃	6 in.	6 in. basem	6 in. basem
X	2½ in.	Stone	Amiesite
Z	.....	Cinders	Cinders
No paving (open track)			

84-lb., 50-ft. rail on wood ties on native soil with native soil ballast. But for the engineers of the commission to have attempted reclassification with a view to numeral standardization would have resulted in complication and delay. This accounts for the apparent inconsistency of the classification.

The last letters of the alphabet were used to indicate the character of paving surface, with supplementary numerals for subscripts to designate variations under the principal group:

- P = asphalt

R = granite

S = macadam

V = native soil

W = concrete

X = amiesite

Y = wood

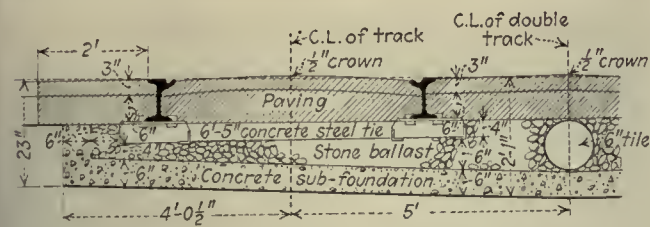
Z = cinders

— = no paving.

Some 160 different combinations of foundation, ballast and track were recognized and some 30 of paving. Actually over 400 different combinations of track and paving were found, but from the standpoint of cost to reproduce, so many of these were practically identical

TABLE IV—TRACK CLASSIFICATION							
Class	Sub-Foundation	Ballast	Ties	Weight	Rail Section	Length	Joint
A-1	6 in. Concrete	Stone	Wood	9 in., 125 lb.	P. S. 273	60	C 12 bolt
B-2	Telford	Stone	Wood	9 in., 84 lb.	L. S. 229	60	C 8 bolt
C-3	Earth	Earth	Wood	5 in., 80 lb.	P. S. 251	60	L 6 bolt
D-4	Sand and Gravel	Stone	Steel Conc.	6 in., 100 lb.	P. S. 163	60	Continuous 6 bolt
F-4	Earth	Stone	Wood	7 in., 70 lb.	P. S. 206	30	C 8 bolt
H-1	Concrete Beam	None	Wood	9 in., 104 lb.	P. S. 260	30	Lorain Weld
J-15	Gravel	Gravel	Wood	4½ in., 56 lb.	P. S. 51	30	L 4 bolt
K-2	Stone	Stone	Wood	4½ in., 70 lb.	Beth. 37	30	L 6 bolt
M-1	Cinders	Cinders	Wood	4½ in., 70 lb.	P. S. 237	30	L 4 bolt

In the "joint" column, a channeled joint bar is indicated by "C," an angle bar by "L"; the number of bolts employed also appears in this column.



ESTIMATED COST OF 100 LINEAL FEET OF DOUBLE TRACK				
Item	Unit	Rate	Quantity	Amount
Rail—G.G. 9 in., 125 lb., 50 ft., 60 ft.	Tons	\$40 00	7.440	\$297.60
Splices—Channel, 32 in., 12 bolt	Complete	2.75	8	22.00
Tie rods—7. ft. centers	In place	0.43	27.2	11.70
Ties—steel concrete, 6 ft.	Each	5.00	32.6	163.00
Track labor	Lineal feet	.55	200	110.00
Concrete sub-foundation	Cubic yard	5.00	36.0	180.00
Excavation—paving	Cubic yard	1.75	53	92.75
other	Cubic yard	.80	81	64.80
Drainage—6 in. V.T. pipe	Lineal feet	.20	100	20.00
—catch basins	Complete	30.00	0.17	5.10
Ballast stone	Cubic yards	1.20	44.2	53.04
				<hr/>
Contractor's profit				\$1,019.99
				71.49
Total				<hr/> \$1,091.48
Paving—Asphalt on concrete	Square yards	2.14	211	451.54

FIG. 11—TRACK TABLE FOR TYPE A2-P

that it was found easily possible to reduce the necessary number of standard types to 50. To indicate the nature of a few of these combinations and the corresponding costs per hundred lineal feet of either single or double track, Table III is given.

In addition, Table IV exhibits the separate details of excavation, ballast and track, and Table V shows the details of paving.

As an indication of the manner in which the over-all cost of the fundamental combinations of track and roadway were assembled there are given two examples out of the 50 standard types. One (Fig. 10) is an inexpensive

rural track and the other (Fig. 11) an expensive city track and pavement.

It is naturally not possible in an article of this length to give the costs and quantity data in any greater detail, but it is believed that enough has been set forth to indicate that the value of the track and roadway investment can by this method be estimated with a minimum of approximation. In addition it is possible to list the property with its assigned value in such a way as to permit absolute identification of each stretch of track in the pricing sheets, as sample shown in Fig. 12. This is similar to the electrical overhead listing sheets, Fig 7.

CONCLUSION

Some of the aspects of the ordinary physical valuation questioned in the former article were the cost, the length of time taken, the uncertainty as to labor costs in connection with the multiplicity of small items, and the inflexibility of the summary as to rational apportionment of the total value among subsequent subdivisions of the property. Superior in the mind of the writer to these objections to an expensive detailed appraisal is the insignificance of appreciable variations in the physical totals when it comes to the actual determination of the reasonable rate. It is felt that the method outlined in this and the previous articles avoids most of these objections and has in addition the advantage, at least in connection with the outside plant, of identifying the location of each piece of valued property and thereby assuring that the errors of omission are at a minimum. Even though the cost of making this appraisal was no more than 10 or 12 per cent of what a detailed-count appraisal would have cost, those who ordered the work as well as those who performed it felt confident that the totals arrived at are just as reliable as if the larger amount had been spent.

[illegible]

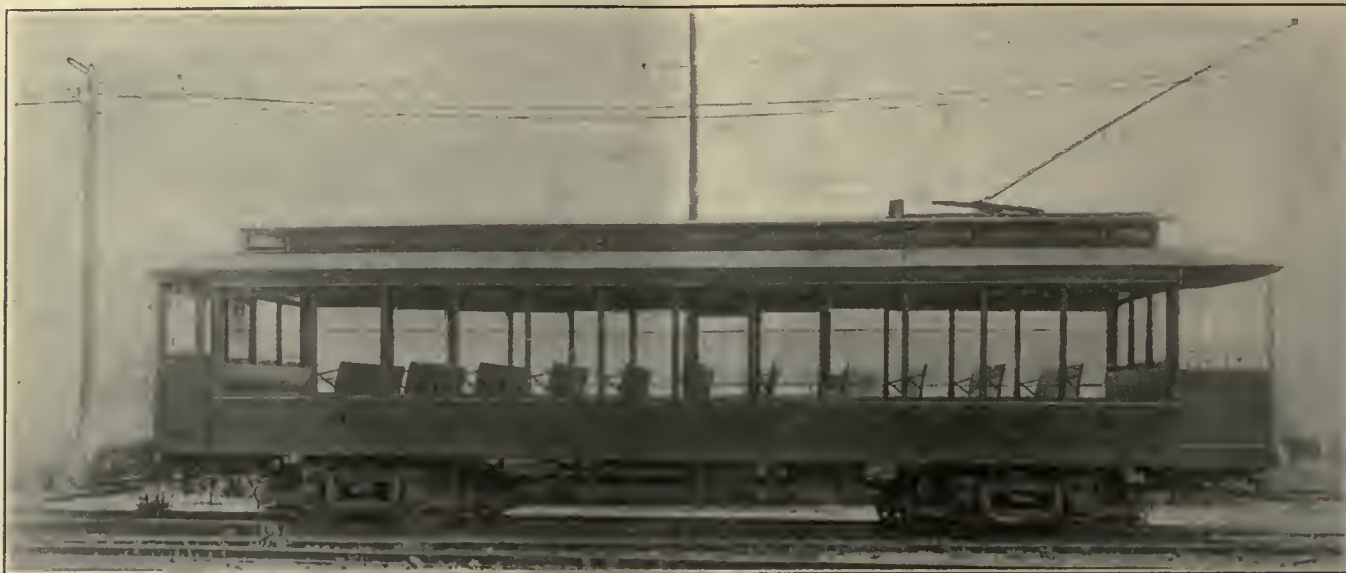


FIG. 1—NINE TRAILER CARS OF THIS TYPE WERE REMODELED BY THE NEW YORK STATE RAILWAYS INTO FRONT-ENTRANCE, CENTER-EXIT CARS

Adapting Cars to Transportation Requirements

New York State Railways Is Gradually Changing Over Rolling Stock to Provide for More Efficient Passenger Interchange and Fare Collection—Latest Examples are Cited

DURING more than four years just past the mechanical department of the New York State Railways has been carrying out a consistent program of remodeling the rolling stock used on the Rochester, Syracuse, Utica and Oneida lines. War and post-war conditions interfered with the continuity of the process, but remarkable results have been accomplished under the direction of J. F. Uffert, superintendent of equipment, and the local master mechanics.

The earliest and largest job was that inaugurated in Rochester in April, 1917, covered in an article in this paper in the issue for April 20, 1918, page 773. The most interesting recent two jobs are the making over of some open-bench cars into those of the front-entrance, center-exit type and the remodeling of a batch of motor cars into trailers. "Before and after" pictures of the



FIG. 3—INTERIOR OF THE FIRST CAR REMODELED FROM TRAILER TO FRONT-ENTRANCE, CENTER-EXIT TYPE

first of these jobs are reproduced in Figs. 1 and 2, and interiors are shown in Figs. 3 and 4. As the New York State Railways operates a number of cars of the Peter



FIG. 5—ONE OF FIFTEEN CENTER-ENTRANCE MOTOR CARS MADE OVER INTO CENTER-ENTRANCE TRAILERS



FIG. 2—THIS IS THE FRONT-ENTRANCE, CENTER-EXIT CAR MADE OVER FROM THE OPEN TRAILER ILLUSTRATED IN FIG. 1



FIG. 4—INTERIOR OF REMODELED CAR EMBODYING IMPROVEMENTS OVER THE SAMPLE CAR

Witt type (see issue of this paper for Jan. 19, 1918, page 120), the experience with which has been highly satisfactory, the present remodeling is a logical development.

Advantage has been taken of several years of operating experience with these cars on the property to incorporate into the present cars the latest ideas in regard to details.

The old open cars were of very light construction, in fact the underframing was so light that sagging had occurred at both ends. It was necessary to reinforce the underframe, which was done by transferring the original $\frac{3}{4}$ -in. x 8-in. steel plates from the entrance side to the devil-strip side, thus nearly doubling the strength of the sill there, and putting in a $\frac{1}{2}$ -in. x 12-in. plate to reinforce the sill on the entrance side. The interior arrangement was made similar to that on the company's other front-entrance, center-exit cars.

Figs. 3 and 4 show some differences in regard to windows, hand rail and floor. The interior shown in Fig. 3 is that of the first of the nine cars remodeled. This has stationary window sash and the floor is slatted crosswise. In Fig. 4 the features of difference are the movable sash equipped with fittings, the handrail offset over the seats and the longitudinally slatted floor.

The cost of this job was about \$1,650 per car.

The second job is also illustrated in "before and after" fashion in Figs. 5 and 6. This involved the making over



FIG. 6—THE FINISHED CENTER-ENTRANCE TRAILER MADE FROM A CENTER-ENTRANCE MOTOR CAR

of fifteen of the center-entrance motor cars of the type shown in Fig. 5, into center-entrance trailers. These cars were originally open cars but they had been transformed into motor cars for supplementary service. (See article by G. M. Cameron in the issue of this paper for Aug. 1, 1914, page 216.) Present operating conditions made their use as trailers preferable to use as motor cars. The remodeling comprised principally the refitting of the interior to utilize the full seating capacity (now fifty-three); to provide stanchions for convenience of passengers in boarding and alighting, and to standardize the window sash and fittings. In addition Peter Smith hot-air heaters were installed; the hand-brake and air-brake equipment was revised, the space under the seats being utilized for all possible elements of the braking system; couplers were added; the cars were completely repainted, and last, but not least, Taylor trucks with 26-in. wheels were installed. The Taylor trucks are designed to accommodate motors to provide for possible changes in service requirements making this necessary.

The changes mentioned reduced the car weight from 27,000 to 22,000 lb. They cost about \$2,200 per car, the subdivision of items being approximately thus: Shop-work, \$800; air-brake equipment, \$400; trucks, \$1,000.

Accomplishments of a Safety Bureau

Accidents Involving Responsibility of Trainmen Materially Reduced—The Same Is True of Damages to Other Cars and Automobiles

BY J. G. JEFFERY

Director of Public Relations Los Angeles Railway

AN EXTENSIVE safety campaign embracing close co-operation between trainmen, the riding public and traction officials has resulted in a marked reduction of all classes of accidents on the Los Angeles (Cal.) Railway. Particularly gratifying results have been obtained in lowering the number of accidents in which the company could be held liable. This safety work has been under the direction of a Safety Bureau created Oct. 1, 1920.

The bureau staff consists of a supervisor of safety, who closely analyzes all accident reports to determine the particular classes of accidents that need special attention, and a traveling supervisor of safety, who spends the greater part of his time on the cars observing operation and instructing trainmen. Two clerks handle the records and correspondence of the bureau.

The safety bureau is notified by the instruction department when a new man is accepted for car service. If such man becomes involved in an accident within three months' time the safety bureau notifies the instruction department when investigation shows the trainman at fault in any degree. A man is then detailed by the instruction department to ride with the new trainman to check up his abilities for safe operation.

When accident reports indicate continued carelessness or inefficiency on the part of a man in service more than three months he is either called to the office and the matter discussed with him or the traveling supervisor of safety rides with him on the car. The latter method has proved highly beneficial. It gives the trainman a chance to show actual difficulties as they occur and the safety expert an opportunity to show correct methods of operation under the actual traffic conditions.

Trainmen's safety committees were organized in each division when the bureau was established and regular meetings were conducted at the carhouses. These meet-

ings for a time brought forth good suggestions, but were later abandoned as they were inclined to develop more controversy than actual beneficial suggestions. However, those that were interested in safety were invited to visit the headquarters of the bureau and discuss features of accident prevention. One of the features of the company's weekly publication are articles by the traveling supervisor of safety prepared in interesting style and in trainmen's language.

Under the company's merit system, upon which the Christmas bonus is based, credits are given for good safety suggestions and for reports of dangerous conditions. This helps particularly in keeping rolling stock in proper mechanical repair. There is also a special award of ten credits for a month's clear safety record.

A gratifying degree of co-operation from auto drivers has resulted from carrying large signs on the dashers of all cars reading, "Autos turn out; we can't." At the same time pointed safety reminders were printed on small cards and hung in the cars. The safety bureau has also been successful through the Los Angeles chapter of the National Safety Council in enlisting the co-operation of the local civic bodies. As an indication of the improvement in safety conditions the safety bureau has compiled the following figures:

The daily average number of accidents in 1920 was forty-eight. In the first half of April, 1921, the daily average was thirty-seven. In March, 1920, there were 1,400 accidents, but in March, 1921, there were only 1,250. This reduction was made with more than 100 cars added in the year. By way of comparison the records of the Automobile Club of Southern California show 1,108 auto accidents in March, 1920, and 1,925 in March, 1921.

The monthly accident records from Dec. 1, 1920, to April 1, 1921, are as follows: December, 1,648; January, 1,480; February, 1,150; March, 1,250. The gain of March over February is partly due to the difference in number of days and also to a general choice of runs by trainmen that month.

Particular interest is taken by the claim department in the reduction of the percentage of accidents for which crews were entirely or partly responsible. On March 20, 1920, trainmen were responsible for thirteen out of the day's fifty-one accidents, as compared with no responsibility for the forty-seven accidents on March 21, 1921.

The cash value of safety is clearly indicated by the fact that damage to cars in collision with other cars and autos was \$3,712 less in February, 1921, than in February, 1920.

The trainmen indicate that they have the spirit of safety first to a greater degree than ever before, all of which is shown in the inter-division safety contests which are held to determine the right to display the "Premier Safety Division" flag from their flagpole. The trainmen are now engaged in a ten weeks' safety contest. A "Safety" pennant is to be awarded for permanent possession to the winner of each contest. The scores are compiled like baseball percentages and are based on past records of the risk of the various routes.

An exhaustive investigation carried on by the Society for Electrical Development to ascertain the facts concerning fires which occurred in the year 1919 in communities supplied with electric service showed that out of a total of 138,553 fires in 345 cities, 3,568 were apparently of electrical origin. These figures establish a percentage for electrical fires of only 2.57.

Retrospect and Prospect*

Railway Pioneer, After Recounting in His Franklin Institute Address the Steps Already Taken in Applying Electric Power to Railways, Expresses the Conviction that There Are Large Opportunities Ahead for Further Developments in This Field

By FRANK T. SPRAGUE
New York City

A RECENT announcement states that in the United States alone electric railways cover a trackage of 44,000 miles and represent a capital investment of approximately \$5,000,000,000, while 300,000 men are employed and over 14,000,000,000 passengers are carried annually, ten times as many as are carried by the steam railroads of the country. In addition there is the like class of roads in foreign countries and thousands of miles of trunk lines here and abroad which are electrically operated or for which electrical equipment is planned.

This is a brief epitome of one of the most astonishing of industrial growths, the product of but a third of the century near the beginning of which Faraday, "late bookkeeper's apprentice, now turned philosopher," revealed his discovery that it was possible to produce mechanical motion through magnetic action, an announcement which was followed ten years later by Henry's announcement of his invention of a crude motor.

But Henry knew that as long as the source of energy was a zinc-burning battery, coal could not be replaced. It fell to Thomas Davenport, a blacksmith of Brandon, Vt., to throw himself heart and soul into the attempt to create an industrial revolution, efforts necessarily failing if for no other reason than lack of a suitable source of power. But to him, in all justice, must be given the credit of first proposing, in a small model, the idea of an electric railway and of being granted the first broad patent as early as 1837.

Two years later there appeared in an Edinburgh publication on "Railways" the confident prophecy: "We have no hesitation in saying that electromagnetism will at no distant date compete with steam as a motive power, and successfully."

But it was eight years later before that splendid old scientist Prof. Moses G. Farmer operated at Dover, N. H., a small car carrying two passengers, to be followed four years later by Professor Page's trip with primary batteries on a road near Washington.

All the experiments of this period were, of course, doomed to commercial failure, not alone because of the crudity of the motors but because the source of power was a primary battery. They were, however, indicative of what would come later when the evolution of the modern dynamo had taken place.

Another ten years passed, when Pacinotti's invention of the continuous-current dynamo marked the birth of the modern electric machine, followed, in 1866-67, by the almost simultaneous announcement from English, German and American sources of the remarkable property of self-excitation by energy built up from the latent magnetism in the iron of the field magnets.

At the end of the decade, in 1870, the Frenchman

Gramme brought out his improvement on the Italian's valuable invention and produced the first commercial machine for continuous-current operation, this machine being later superseded by the Hefner-Alteneck drum or surface-wound armature, invented also by Rowland.

Then came a discovery declared by Maxwell to be the most important of modern times, the reversibility of function, that which made it possible for the same machine to be used either as a dynamo for converting mechanical energy into electricity or as a motor to convert electricity into power, with the necessary corollary, the electric transmission of energy by coupling two such machines together in the same circuit.

It is said that Pacinotti discovered this also, but this is not an established fact, while it is certain that Gramme demonstrated it at the Vienna Exhibition in 1872 after its possibility was disclosed by a workman's mistake in coupling up a machine to the circuit. Here were at hand all the essentials of a successful beginning of electric railway experiments, but years went by until a quarter of a century had elapsed since Farmer's and Page's experiments.

Then came the crude suggestions of Greene, a poor mechanic of Michigan, who was afterward allowed a very broad patent, and the early plans of Field, who conceived in San Francisco the idea of replacing the cable by electric power. At the Berlin Exhibition in 1879 Siemens made the first public demonstration of a motor pulling a passenger car and operated with a third-rail supply and track return from a continuous-current dynamo-electric generator. This was followed by other exhibitions and then by the equipment of a one-car line at Lichterfelde, opened for traffic in May, 1881. This was the first line put into service.

In 1880, and again in 1882, Mr. Edison experimented with short electric railway lines at his laboratory in Menlo Park, later joining hands with Field in a company which never got beyond the experimental stage and did no commercial work whatever. A patent interference between Siemens, Field and Edison resulted in Siemens being ruled out because his foreign work was not admissible, and a patent was granted to Field, but in terms which proved unsupportable.

SPRAGUE LEAVES THE NAVY TO ENTER ELECTRICAL WORK

In this latter year the writer, then a naval officer on duty in London as a member of a jury at the Crystal Palace Exhibition, proposed a complete system for the Underground Railways, this being followed by a plan for operation with an under-contact overhead trolley following the lines of all tracks and switches, and with rail return. But after resigning from the naval service he devoted himself at first to problems in electric lighting as Mr. Edison's assistant and then to the development of industrial motors through his own company

*Abstract of address at meeting of Franklin Institute, Philadelphia, Pa., on occasion of award of Franklin medal to Mr. Sprague.

until 1885, when he announced plans for equipping and operating the New York Elevated.

During this period there was a renaissance of activity in electric railway development, Van Depoele, Daft and others installing a number of small installations. That by Daft on the Hampton branch of the Baltimore Union Passenger Railway in 1885 was the first railroad regularly operated by electricity in this country. Daft's other most ambitious work consisted of experiments carried on on the Ninth Avenue Elevated Railroad in New York in 1885 and 1888 with two electric locomotives named the "Ben Franklin."

In 1885 the writer, before the Society of Arts in Boston, outlined for the Elevated a new project, to comprise motors carried on the trucks, geared directly to the axles, and with provision for regenerative action and electric braking, following this announcement with important experiments for several months at the Durant Sugar Refinery and on the Thirty-fourth Street Branch of the Elevated, in 1886, where he demonstrated his wheelbarrow method of motor suspension, dual control, regenerative braking and the interpole winding on two motors carried on a truck underneath the car body.

These tests were followed by several with storage-battery cars in various cities, but this method of operation, while promising, has never been able generally to compete with the system of direct supply.

At the beginning of 1887 there were in the entire world nineteen installations, nearly equally divided between Europe and the United States. These aggregated about 60 miles of track and less than a hundred motors and motor cars, and they exhibited the widest variations in equipment and operating characteristics, none of them serving as an acceptable type for adoption. In short, the art was in a chaotic state, and something was necessary to demonstrate that the infant had a manhood ahead of it.

RICHMOND ROAD NEARLY DOUBLED WORLD'S ELECTRIC ROLLING STOCK

Fortunately that opportunity came to me, and the modern trolley with its sequence, electric traction in general, may be fairly said to date from the installation of the Richmond road, the contract for which was taken in May, 1887. We had little to show save a blueprint and a few crude machines, but faith was strong and the contract was taken under terms, price and guarantees easily placing it in the "knave or fool class," the designation applied by a scientist to Daft's project two years before in Baltimore.

The contract called for the completion in ninety days of the equipment of a road having about 12 miles of track, at that time unlaidd and with the route only provisionally determined; the construction of a complete steam and electric control-station plant of 375-hp. capacity, and the furnishing of forty cars with eighty motors and all the appurtenances necessary for their operation. This was nearly as many motors as were in use on all cars throughout the rest of the world. Thirty cars were to be operated at one time, and grades as steep as 8 per cent were to be mounted. Finally, the payment was to be \$110,000 "if satisfactory."

Fortunately for the future of electric railways the difficulties ahead could not be foreseen, otherwise the contract might never have been closed. But disheartening as these were, great as was the expense incurred and grave as were the risks encountered, they were justified by the results, for the Richmond road, by com-

mon consent, stands as the prototype in almost every essential detail of the modern electric trolley system, and its installation marked the real beginning of the great industry of electric traction.

The history of the Richmond road has been too often written to make it necessary now to dwell upon it at any length. Suffice it to say that after experimental runs in the latter part of 1887 it was put into commercial operation in the beginning of February, 1888, and for a year there followed an experimental period of development which taxed the resources of the company to the limit.

Pope, in a historical sketch read before the Electric Club in 1891, was appreciative enough to say: "Laboring under enormous difficulties and drawbacks, Sprague succeeded by the completion and operation of this (Richmond) plant in establishing beyond peradventure the future supremacy of the electric street railway, and many of the characteristic features at that time designed and introduced by him have practically become standards in the modern system and are found in nearly every one of the thousands of cars now in service."

Among the characteristics were the main and working conductors and feeders, the bonded rails and earth return, the universal-movement reversible trolley in the center of a car, double-end control, axle-suspended motor, series-parallel grouping, variation of field resistance, fixed end-contact brushes and lightning arresters.

The road soon commanded the attention of Henry Whitney of Boston, who soon afterward abandoned his cable projects and adopted electricity.

Richmond's early troubles were buried under a loss of \$75,000, fully compensated in the subsequent growth of a great industry.

The use of the tracks by the trolley system accentuated the already serious trouble of the telephone companies, who were also using grounded circuits, and then followed a country-wide legal fight as to earth rights claimed by the telephone companies. The result was a foregone conclusion and eventually they adopted metallic circuits, for which compulsion they can thank the trolley.

HORSE RAILWAY ELECTRIFICATION ENTERS ACCELERATION PERIOD

The ensuing two years was a period of extraordinary activities, the Sprague company and the Thomson-Houston company, which had succeeded the Van Depoele company and which followed generally the Sprague practice, contracting for over two hundred roads. In Italy, at Florence, and in Germany, at Halle, the first modern roads also were installed on the Sprague system.

As typical of municipal efforts the slogan of a mass meeting called in New Orleans is illustrative. It was: Lincoln Set the Negroes Free! Sprague Has Set the Mules Free! The Long-Eared Mu'le No More Shall Adorn Our Streets.

Then came the consolidation of the Sprague with the Edison General Electric Company, and a gradual improvement in, and increase in size of apparatus. Form-wound armatures, proposed by Eickemeyer, replaced irregular windings and metallic brushes gave way to carbon, this single change, initiated by Van Depoele in 1888 and 1889, going a long way toward making the art a success. Cast and wrought iron yielded to steel, two-pole motors to four, double-reduction gears to single, and open motors to closed ones protected only by their

own castings. In 1892 the combined series-parallel and resistance control was adopted, when the Thomson magnetic blowout was successfully applied to controllers by Mr. Potter and proved a most effective agent in reducing the troubles of operations.

Limited for a time in extent of operation by the standard of voltage adopted, the invention of poly-phase alternating-current transmission, the transformer and the rotary by Ferraris, Tesla, Stanley, Bradley and others, widened out the field by making possible the economies of high-tension transmission, with the advantages of direct-current distribution and motors.

Meanwhile, a few locomotives were built, but to follow steam precedents seemed a pitiful falling short of the possibilities of electric equipment and operation and having developed a system of electric elevators with secondary switch control it suddenly flashed upon me that I could apply a like principle to railway operation; that is, make up trains at any length by the combination of car units, wholly or partly equipped with motors and with train lines, without regard to number, end relation or sequence, and to control such trains from either end of any car by a master switch connected to the common train line.

This idea, sketched quite fully on a scrap of paper, marked the complete birth of this new method, then named and now everywhere known as the "multiple-unit system." Its great possibilities instantly absorbed my interest, for I saw the opening of a new epoch in electric railway operation. Here was a way to give a train of any length all the characteristics of a single car, with every facility of operation demanded by the most exacting conditions of service and capacity, and with like control of any number of locomotives.

EPOCH-MAKING MULTIPLE-UNIT INSTALLATION ON CHICAGO ELEVATED

After two years' abortive attempts to get the privilege to demonstrate at my own expense the advantages of the system in New York, the opportunity suddenly arose in Chicago, where I was called in consultation on the South Side Elevated Railroad. Here, just ten years after the contract for the Richmond road, I took one for operating an extensive elevated equipment under conditions even more onerous and with, perhaps, less to show in a tangible way.

As I was called to London in connection with an extensive elevator contract for the new Underground Railroad then under construction, plans for operative tests were restricted in time and development, but on July 16, 1897, after but a few weeks' preparation, two cars were put into operation on the tracks of the General Electric Company, at Schenectady, and on the 26th, the half century anniversary of Professor Farmer's test of a model electric railway at Dover, my ten-year-old son operated a six-car train in the presence of the officers and engineers of the road.

There were, of course, troubles a-plenty, but by the following spring the entire equipment of 120 cars was in regular operation and every steam locomotive was out of service.

The multiple-unit system is now, the world over, an essential fundamental for all electric train operation where two or more equipped cars or locomotives are controlled from a common source, and its value in dense rapid-transit service like that in the subways in New York is indicated by the enormous increase of capacity compared with any other method of operation, a prac-

tical result which could not be equaled in any other way on the New York subways alone for less than \$100,000,000 increased capital cost of construction.

HEAVY ELECTRIC TRACTION NEXT IN ORDER

Following a serious accident in the yard tunnel of the New York Central Railroad, the first step in America in main line electrification was taken when electricity was adopted for operation at, and for some distance from, the city terminal. And here again there was a radical departure in engineering practice, proposed by Mr. Batchelder.

Up to that time all motors used for railway purposes maintained a fixed relation between the armature and the field, but the locomotives adopted here were bipolar, the fields being supported by the locomotive frames, while the armatures were on the axles and free to move vertically with reference to the flattened field poles. Brackets and gears were thus dispensed with and the machine reduced to the simplest elements.

The assumed limitations of direct-current motors, with which I was in entire disagreement, and the development in alternating-current apparatus, led many engineers to predict the complete supremacy of the latter, in accordance with which belief single and poly-phase and combined-phase roads were installed in America and Europe, the most notable here being the Great Northern polyphase and the New Haven single-phase, and in Europe certain Swiss and Italian roads. The controversies which arose were unduly bitter and were based very largely on the assumption that all the apparent merits claimed for single-phase operation should be accepted, even without trial, as a basis, while the possible advances in the rival direct-current system were ridiculed.

The coming of the interpole motor, a modification of the old Sprague Elevated Railway experimental type, put a new aspect on the controversy. Direct-current potentials were promptly increased, first to 1,200 volts, then to 2,400 volts and higher. The largest trunk-line installation thus far undertaken, that of the Chicago, Milwaukee & St. Paul Railroad over the Great Divide and the Cascade Mountains, is operated at 3,000 volts, while experimental operation has reached 5,000 volts.

In England the direct current has been officially adopted for future railway equipment, on the report of a special commission, and a like influential French commission has indorsed the same system after an extended investigation of the work done in the United States.

Despite the enormous advances made and the results accomplished in electric railway development, it would be folly for the electrical engineer or the railroad man to assume that the limit of invention or improvements has been reached. The urban and interurban fields, with the constant linking up of smaller into larger systems, go on expanding, but the trunk lines are still largely steam operated, although there are many thousand of miles here and abroad, on great systems, for which electric operation has been decided in the future. There is still a wide difference of opinion among engineers as to whether a single system will be dominant, and if so, which one, or whether the varying conditions and operating demands will be best met by specific solutions.

The financial question involved in the large cost of equipment cannot but remain a factor which will often prove controlling, for electrical operation will generally be adopted only where there is a commensurate gain

of some kind. Where coal at low unit cost is available the gain in economy alone will not warrant the adoption of electricity on independently operated roads, but where the coal is high in price, or may be unavailable, while water power can be had at a reasonable cost, there is a valid reason for change.

Excluding special cases, what will ultimately be constructively influential is the need of increase in existing or available track capacity, which is undoubtedly possible to a system which permits of individual and simultaneous control of a concentrated or distributed power plant greater than can be got by any other means and can eliminate from its tracks the transportation of its fuel. It seems certain, however, that there must be co-operation in the important matter of power supply, and the whole trunk-line problem will appear less formidable with the elimination of the requirements of installations of individual power houses, with their necessary reserves, and the use of current from great industrial power houses properly linked together, which, in addition to their reliability, can make full use of the diversity factor in a multitude of demands.

Chicago's Transportation Problems

Aspects of Steam Railroads and Rapid Transit Service
Considered by Various Speakers at the Spring Meeting
of the American Society of Mechanical Engineers
Held at Chicago

SIX papers on this topic were presented at the spring meeting in Chicago of the American Society of Mechanical Engineers, May 23 to 26. In the first paper J. R. Bibbins, Chicago, gave reasons for the growth of the freight traffic in Chicago. These are that the city is the principal east-west divisional transfer point between east and west railroads; it is the northern rail-head of the Mississippi Valley roads and is the water gate for the interior via the Great Lakes route. The individual railroads have chosen individual terminal development to a large extent, but all the principal local freight terminals are within the one-mile zone downtown.

In a second paper E. J. Noonan discussed the possibility of a more intensive use of railway property through the development of air rights and suggested among other things two-level type freight stations with double-deck streets.

A third paper by Hugh E. Young spoke highly of the container system and declared that the motor truck can never take the place of the rail carrier for long hauls and cannot handle carload freight business in an efficient manner.

A fourth paper by Messrs. Bibbins and Noonan gave particulars of the existing Chicago electric freight tunnel, which is at present handling approximately 1,800 tons of l.c.l. freight, although its capacity is possibly five times that amount. The tunnel now has about 65 miles of line and \$15,000,000 investment. A study of the reasons for this comparatively small use shows that some of the reasons are avoidable and some not. A study of the existing union tunnel freight stations shows the following results on design:

1. Platform stations required 25 sq.ft. per ton per ten-hour day.
2. Service track required one standing car per 10 tons handled per day.
3. Average load per car 1.4 tons general merchandise.
4. Team platform length 0.42 lin.ft. per ton per day.

5. Elevator capacity thirty round trips per hour now, thirty-six maximum when speeded up.

6. One thousand-ton station requires 25,000 sq.ft. of floor space, 420 lin.ft. of platform frontage, 1,260 ft. of standing track, two elevators, ninety merchandise cars.

The conclusion of this paper is that from the standpoint of the city of Chicago no transportation agency could be more effective in solving the problem of existing track capacity, and no effort should be spared to make this institution one of permanent success.

The fifth paper, by Mr. Bibbins, describes the points to be considered in a terminal survey. The sixth and last paper is by Bion J. Arnold and it is entitled "The Relation of Steam Roads to Rapid Transit Development." An abstract follows:

The Relation of Steam Roads to Rapid-Transit Development

By BION J. ARNOLD
Chicago, Ill.

THE time has come for steam railroads entering large cities, especially those who are fortunate enough to own entrance rights-of-way strategically situated for long-haul suburban traffic, to enter the rapid-transit field and enter it properly.

The case of Chicago may be analyzed briefly for illustrative purposes. While Chicago is territorially a big city, 200 square miles in area, with commuter suburbs extending 15 to 20 miles in all directions, its business center is highly concentrated within a so-called "loop" (eight times ten blocks), wherein is conducted the major portion of the wholesale, department store, high-class shopping, theater, restaurant, club, business and centralized social activities of the city. Twenty-six railroad carriers enter this central district over twelve major trunk lines with a traffic of 1,340 trains and 195,000 passengers per day. All this business is concentrated in five passenger stations, which are clustered around the boundaries of the Loop and as close in as the price and competitive condition of property permitted at the time when the stations were originally located.

None of these, with the exception of the Illinois Central development, is especially adapted for the economical and quick handling of commuter or rapid-transit business. On the other hand, they are distinctly ill adapted for handling the large growth in future traffic which will undoubtedly come. There is no intercommunication between them and consequently they must necessarily remain as traffic "dumps," rather than as traffic distributors.

The Illinois Central lake-front system alone approaches the ideal of a rapid-transit distributing system, with stations distributed along the boundaries of the business district instead of concentrated at one point.

The statement is frequently made by railroad executives, and without refutation, that the commuter rapid-transit business does not pay or is carried at a large loss which must be made up by the long-distance overland passenger and freight business. If this is true, the railroad managements of the country, which are confronted with the problem of adequate revenue, stand in the inconsistent position of harboring a passenger-terminal system and conducting a public service at the expense of the stockholders or the other patrons of the system. Either aspect, if true, represents an unstable economic condition which cannot last. And if the commuter traffic is not in fact supporting the full cost

of producing this service, there is no better time than the present for the railroads to establish the facts in the case and endeavor to have this traffic handled in a more practicable manner.

TRUNK LINES SHOULD CO-OPERATE IN TRANSIT PLANS

However, there are some who believe that railroad accounting has not yet been sufficiently perfected to reveal fully the equitable allotment of terminal and service charges as between long-distance and local rapid-transit service on the steam railroads. Those who defend the use of the monumental terminals claim that they would be required in any event for cross-country travel and that the rapid-transit service can therefore be accommodated at very little cost off hours, as a by-product. But this is hardly the case in a large community such as Chicago, for the rapid-transit peak practically coincides with the main-line peak, especially in the morning when overnight travel reaches the city. Still it is claimed that this commuter travel should not bear the same operating costs and fixed terminal charges per passenger as the overland traffic because the suburbanites use relatively few of the main-station facilities. Whether this is true or not, it is believed by many engineers in railroad service and in civil life that some careful and thorough research into the economics of railroad suburban-passenger business should be instituted at once, with the specific object of finding out whether the railroads could better handle it or should turn it over to some other agency better organized for the purpose.

The hopeful plan in mind seems to be that the steam railroads which are so strategically located with respect to long-haul, suburban commuter traffic should undertake an immediate reorganization of this great arm of local transportation and co-ordinate its services with the other surveys of the city in such a way that unified operation of the entire local transportation business may be carried on with the least total expense and maximum usefulness.

The Law of Electrolysis

Analysis of Fifty-three Higher Court Decisions Bearing on the Subject Condensed in a Compact Form Which Will Make It of Interest to Railway Men

IN A RECENTLY published pamphlet Samuel S. Wyer, consulting engineer, Columbus, Ohio, discusses at length some of the legal phases of the electrolysis problem under the title "Analogy of Responsibility for Damages from Leaking or Stray Electric Currents from Electric Railroads to Adjudicated Responsibility for Damages from Leaking Water, Oil or Gas, Noxious Gases or Sparks."

In the introduction the author defines the term "stray current" and explains why stray currents are likely to be destructive agents. He also lists the various classes of underground property most likely to be affected by stray currents. In another part of the report, which is also devoted to the technical side of the question, the more important damages or causes of damage are given as: Fire hazard due to arcing between pipes in a building; gas explosions caused by stray currents igniting gas in basements, manholes, etc.; damage to water pipes, telephone and power cables and metal work in underground structures.

It is assumed in the discussion that the following engineering facts have been established:

1. There will always be some current leakage where a grounded return circuit is used and this leakage can be measured.
2. Stray currents injure underground metallic structures where they leave such structures to go into the soil.
3. Proper mitigating methods will so reduce the leakage as to render it not dangerous.
4. The double-trolley system would eliminate all stray currents and stray current troubles.
5. The cost of elimination or mitigation is not prohibitive considering the hazard which is to be guarded against.

COURT RULINGS ON ELECTROLYSIS

In the discussion of the legal phases it is pointed out that there have been only three important electrolysis court decisions: Manufacturers' Natural Gas Company vs. Indianapolis Street Railway, Dayton vs. City Railway, and Peoria Water Works vs. Peoria Railway. The bulk of the discussion is devoted to an analysis of the pertinent portions of fifty-three important higher court decisions bearing on responsibility for damage from leaking water, gas, oil or noxious gases and sparks. Of these decisions there are one by the United States Supreme Court, one by the British House of Lords, one by the British Privy Council and thirty-one by the supreme courts of various states. The several decisions are arranged chronologically, beginning with a decision of the New York Supreme Court in 1856. In each case the quotation from a decision is followed by what is termed a "stray current analogy"; that is, a statement of what would have been said had the same line of reasoning been applied to stray electric currents. The final conclusion reached is that the old legal maxim "Every man has a right to use his own property as to himself seems proper, but he must be careful so to use it that no injury is done to another" should and can be applied to responsibility for damage from electrolysis or other stray current injury.

The pamphlet is of interest to railway men chiefly because it condenses in a compact form a large number of legal decisions bearing on the stray current problem. It may be pointed out that the same decisions also have some bearing on the legal phases of the inductive interference problem, which of late has been so important in connection with the increasing density of electric power and communication service. The decisions quoted all bear on the fundamental law of the land as it pertains to the rights and duties of the fee simple owners of real property.

There is no analysis of those problems pertaining to the rights of the public in connection with public utility properties nor of those where both parties involved are using public property by virtue of an easement right.

Constantinople Tramways

STREET railway service in Constantinople was stopped in December, 1918, and was gradually resumed beginning March 5, 1919, reaching normal in June. The fares are five times as great as before the war.

Some rolling-stock ordered in Europe has been received and many cars are being rehabilitated. According to the *Revue Générale de l'Electricité*, from which these notes are taken, the exchange rate has been a severe handicap to the railway system.

Trackless Trolleys for New York

Department of Plant and Structures Specifies Details of
Trolley Bus to Be Operated on Staten Island
in Connection with Municipal
Trolley Line

THE city of New York, through its board of purchases, has asked for bids for seven electric motor-driven trackless trolley cars. These are to be put in operation by the department of plant and structures in connection with the municipal trolleys now in operation on Staten Island. The routes for operation will be from Meier's Corner to Linoleumville, and from Manor Road and Schmidt's Lane to Sea View Hospital. The bids were advertised on May 7 and were scheduled to be opened on May 23.

The cars are to be of the semi-open type and equipped for one-man operation. All structural steel shapes, rivet steel, castings, etc., are to be in accordance with the A. S. T. M. specifications. The contractor is required to deposit \$1,000 to cover the cost of inspection during construction.

The completed car must be able to travel with a load of 10,000 lb. over New York City thoroughfares without showing evidence of weakness and excessive heating in any part. Tests must also be made by the contractor to conform to all rules and regulations of the New York Public Service Commission and other city and state departments having jurisdiction. Broken parts due to defective design, materials or workmanship are to be replaced without expense to the city for one year.

Some of the requirements of the chassis frame are that it is to be of 6-in. channel section, weighing not less than 13 lb. per foot, properly reinforced with hot-riveted gussets at all corners and intersections of cross members. The front axle is to be of I-beam section, of 3.5 tons capacity, equipped with ball-bearing steering head and roller-bearing spindles. The rear axle is to be of 2.5 tons capacity, fitted with worm drive and full ball bearings, and with internal brakes of 18-in. diameter. Spindles are to be 2.75 in. diameter. The front springs are to be 50 in. long and 3 in. wide with eleven leaves, while the rear springs are to be 56 in. long, 3 in. wide, with fifteen leaves.

A steel body is specified, constructed with steel uprights and rolled steel carlines, all joints to have gussets and to be hot riveted. The body below the window sill is to be paneled with $\frac{1}{4}$ -in. "Steelosote" and so arranged as to be easily replaced in case of damage. The roof covering is to be "Steelosote," in sections shaped to conform to the contour of the roof structure. The floor is to be tongued-and-grooved maple and covered with rubber inlaid tile flooring.

The main entrance and exit door is to be located on the right-hand side, of the two section folding type and operated by a hand lever. An emergency door, fitted with a collapsible folding step, is required at the rear. Plate-glass windows of the best D.T.A. car glass, mounted in brass window sash with detachable rubber weather strips, were specified, as were also Pantasote window shades with rollers and car fixtures.

The carrying capacity of the car is to be thirty seated passengers, with standing room for ten additional. The aisle-way is to be 24 in. Cross seats, 30 in. wide, with steel seat frames fitted with Marshall spring cushions and backs trimmed with No. 1 machine-buffed genuine leather are to be used. In the

roof is to be an exhaust ventilating system, and a buzzer signal system is included for convenience of passengers.

Each car is to carry one 25-hp., 600-volt, direct-current motor of the box-frame commutating-pole, self-ventilating, ball-bearing type. The forward end of the armature shaft is to be tapered to fit a standard universal coupling on the drive shaft. The opposite end of the armature shaft is to be equipped with a direct-current generator to charge an 80-amp.-hr. storage battery for marker and emergency lighting.

The type of control specified is of the rheostatic (K) type with five points arranged for foot operation, hand operation being for use only in emergency. The reversing feature is to be the same as in any standard K-type railroad controller. The positive line is to carry a standard railroad-type circuit-breaker while the negative side of the circuit is to be fused.

The drive from the motor to the rear axle is to be through a tubular propeller shaft fitted with universal joints at both ends. The steering gear is of 3.5 tons capacity, compounded at a ratio of 2.5:1 and fitted with a 22-in. handwheel. Or, instead of the axles, drives and motors specified above, truss axles, internal gear drives and multiple motors may be used. The capacity of axles and drives and the aggregate power of the motors, however, shall not be less than already specified. Internal gears shall have not less than two gears bearing on the driving gear.

DETAILS OF EQUIPMENT

Regular foot and emergency hand brakes, following automobile design, and a 12-in. foot gong are to be furnished.

Front and rear wheels are to be of the American cushion type, with solid rubber tires. They are to be 36 in. in diameter, with a 6-in. tread, and made of second-growth hickory.

The electric heaters specified must provide an even distribution of heat throughout the car with a maximum power consumption of approximately 6 kw. and have an arrangement for three temperature graduations of 2 kw. each. Heater wiring is to be in conduit under the car body and in molding inside.

The main lighting circuit is to carry ten round, 110-volt, 23-watt-type lamps mounted in flush-type receptacles, and the emergency lighting circuit, operated from the storage battery, is to consist of four 6-volt 15-cp. lamps in special dome fixtures. There are to be two 6-volt, 21-cp. headlights and two front and one rear 6-volt, 4-cp. marker lights. All headlights and markers are to operate from the storage battery.

The trolley-pole collector, or pole head, is to be of the sliding type for use with a wire spacing of 14 in. It is the intention that operation shall usually be in but one direction, but provision is made in the design for operation in the reverse direction for short distances at low speed. Another requirement of design is that if the pole head leaves the wire it will not cause a short circuit due to metal parts spanning the two wires. The shoes or contact parts must be renewable, have a liberal contact surface and be fitted with grooves for retaining a lubricant.

Requirements also call for an adapter fastened to the pole head and a trailing rail contact shoe so as to make it possible to operate the car at slow speed on a 600-volt grounded return circuit.

The trolley pole must be sufficiently rigid to force the pole head or contactor against the trolley wires

at a normal working upward pressure of 36 lb. Provision must also be made against short circuit if the pole crosses both trolley wires, and two No. 4 extra flexible insulated cables suitable for carrying 600-volt power are to be used for conductors.

The trolley base is to be of the hand maneuvered type, provided with slip rings so that the pole can be rotated. All bearings are to be of the roller type. The top thrust bearing is to be so constructed that the lubricant cannot leak out on the car roof or down the maneuvering mechanism. Another provision is that the pole head must keep in contact with the trolley wires should the car turn out for another to pass. A buffer spring is required to absorb upward blows in case the pole leaves the wire, with a latch to lock the pole socket in a horizontal position during removing or installation of trolley poles. The maneuvering mechanism is to be of such construction that the operator can rotate, raise or lower the pole without leaving his seat.

Supports are to be provided for a fare box which can be placed at various angles and so held stationary. Finally, the regulations for painting call for the most thorough and careful method known for passenger cars with the special object in view of providing a rust-inhibitive coating. The exterior finish is to be full oil gloss and white enamel for the interior. The paints used must follow New York City specifications.

New Resistance-Type Arc Welder

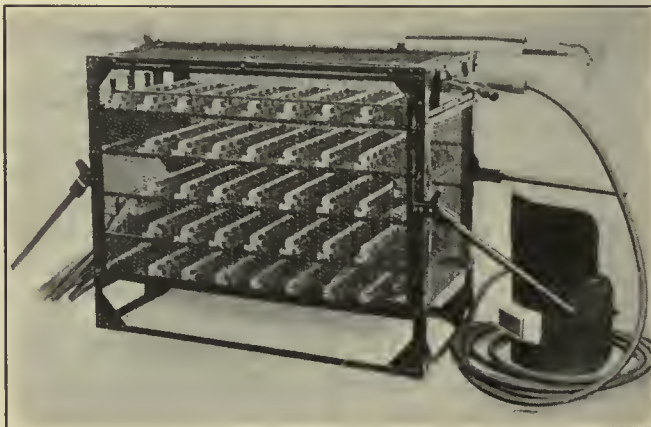
A NEW electric arc welder, called the "Ajax," is being placed on the market by the Railway Track-Work Company, Philadelphia, Pa. It consists of special wire resistance coils supported on insulator bars which are mounted on a frame of steel angles. A switchboard for controlling the current is mounted at one end of the frame.

The type of machine which is recommended for rail-

way work weighs approximately 100 lb., and is 18 in. x 36 in. x 36 in. in size.

The designers of this machine have given special consideration to high current capacity, accessibility of parts, ventilation and portability. The wire used in the resistance coils is a special grade of very high resistivity adopted after several years of tests and experiments.

A control mechanism, consisting of a line switch by means of which current can be cut off from all the coils, is mounted on one end of the framework. At the oppo-



NEW RESISTANCE-TYPE ARC WELDER

site end the switchboard for regulating the current is mounted. A shunt switching device provides for short-circuiting a portion of the coils where large currents are required. By this arrangement control over several groups of coils is made independently of the other groups. The switchboard provides for thirty-six values of current.

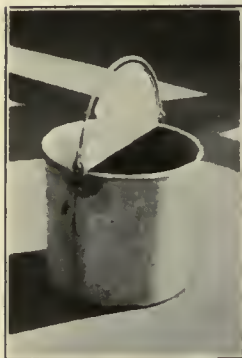
Several plugs are provided for attaching the lead wires to the machine. These plugs have wooden handles to protect the operator from shocks and also to prevent short circuits.

Just After Lunch at the Wethersfield Carhouse

This Large Group Indicates the Success of the Joint Meeting of the Two Organizations Which Resulted Largely from the Efforts of I. A. May, Past-President of the New England Street Railway Club. See Last Week's Issue for Details.



Closed Buckets for Track Oilers



COVERED TRACK-
OILING BUCKET

IT USED to be the case on the Pacific Electric Railway that frequent complaints arose about track oilers traveling around on city cars with oil buckets. Oil running down the sides of the buckets offered an opportunity to mar or ruin the clothes of passengers, even though the oilers' instructions required them to seek an isolated section of the car.

To remedy this condition the engineering department devised a closed type, galvanized-iron oil-carrying bucket. It is neat in appearance and when properly handled by the track oiler there is no chance of spilling oil over the side of the bucket. There is an opening in the lid so that it may be closed without removing the brush.

Practical Track Oiling Equipment

ON THE Pacific Coast the sanding of the city tracks is one of the most important units of track maintenance because of frequent heavy fogs and light misty rains. The engineering department of the Pacific Electric

Railway has employees who are held responsible for the sanding of the tracks.

For efficiently handling this element of maintenance work, particularly when the sanders are given an emergency call during foggy weather, they are equipped with an open-top sanding bag constructed of heavy canvas cloth and provided with straps which go over the shoulders. Attached to the bottom of the bag is a piece of rubber hose 6 in. in length with a $\frac{3}{4}$ -in. opening. An iron tube 3 ft. in length, with a $\frac{1}{4}$ -in. opening, is carried by the



SANDING BAG USED ON CITY
TRACKS OF PACIFIC
ELECTRIC

sander, who inserts the tube in the rubber hose section when he wishes to begin operation.

When the conveyor tube is not in use, the flow of sand is shut off by merely raising the piece of rubber hose. Likewise, when the sander desires to cease sanding, he merely elevates the iron conveyor tube without detaching it. The benefit of this practical sand bag is its simple arrangement, which makes its operation efficient and economical and which permits work to be handled with dispatch, especially in congested localities.

Association News

Important Meeting of Way Matters Committee

THE committee on way matters held an enthusiastic two-day meeting at association headquarters on May 18 and 19. The meeting indicated that the report of the committee will contain much information on live subjects dealing with track and roadway maintenance.

Among the members present were R. C. Cram, chairman; C. A. Alden, V. Angerer, W. R. Dunham, Jr., E. B. Entwisle, H. H. George and E. M. T. Ryder. Others in attendance on invitation were W. P. Day and F. H. Ogden, International Steel Tie Company, Cleveland, Ohio; H. L. Whittemore, United States Bureau of Standards, Washington, D. C.; G. C. Farkell, National Tube Company, Lorain, Ohio; F. A. Weymouth, Bethlehem (Pa.) Steel Company; W. J. Sheehy, East Rochester, N. Y.; W. W. Wysor, United Railways & Electric Company, Baltimore, Md.; E. F. Hartman, Crotexol Corporation, and S. W. Dannett, Rail Welding and Bonding Company, New York City.

Among the subjects on which definite action was taken for inclusion in the final report were design of curved treads for girder and girder guard rails, method of determining brittleness in rails which entails a change in the specifications for girder rails, a new specification for rail-bound insert special trackwork, and a comprehensive investigation on arc-weld joints, the report on which will contain many data and illustrations.

The Bureau of Standards again expressed a willingness to co-operate in forming a special committee to undertake tests of all forms of welded joints. The way committee recommended that the special committee consist of the following representatives: One each from the Bureau of Standards, the University of Illinois, the manufacturers of welding materials and the American Bureau of Welding and two from the Engineering Association.

In connection with the study of substitute ties the International Steel Tie Company presented a treatise on its form of tie which explained all the details of construction. A model of a pressed steel substitute tie, recently patented, was also shown by the inventor, W. J. Sheehy. A progress report will be made on this subject and reassignment asked for the ensuing committee.

The sub-committee appointed to study curved contour for wheel treads, jointly with the committee on equipment, will submit a progress report. It was the sense of the way committee that the present data are not sufficient to prove or disprove the theory that the curved wheel tread would be worthy of adoption. Continuance is to be asked for the ensuing committee.

A list of approved standards was presented and will be suggested to the committee on standards for submission to the American Engineering Standards Committee.

A progress report, with tables and appropriate information, is to be included in the final report of the committee on clearance curves as a matter of informa-

tion. The sub-committee on standardization of frogs and track centers in special trackwork layouts presented a report on standard turnouts and crossovers which also amends various specifications now in the Engineering Manual as to frog angles, frog-arm lengths and radii of switches and mates.

A report on wood preservatives covering a number of important specifications for creosote oils and other preservatives and methods of preservative treatment of timbers was accepted. It will be published as a separate paper and will cover the joint report of the three principal committees involved. Mention to that effect will be made in the annual report of the way committee.

Chairman Cram is to outline for the benefit of the secretary his views as to research work that can be done by the experiment station of Illinois University on welded joints and curved wheel treads.

Merchandising Transportation Committee Meets

THE T. & T. Association committee on merchandising transportation met at association headquarters on May 20 to discuss the subject in hand preparatory to completion of the report to the coming convention.

Among those present were V. L. Lloyd, Cleveland, representing J. H. Alexander, chairman; W. H. Boyce, Beaver Valley Traction Company; K. A. Simmons, proxy for M. B. Lambert, Westinghouse Electric & Manufacturing Company, and J. W. Welsh, acting secretary. Letters from several other members of the committee reporting on the subject assigned were available for discussion.

In reviewing the subject of courtesy of train crews, it was brought out first that courtesy begins at home and it is necessary to instill this fact first in the minds of the supervisory force. Meetings with this class of employees usually produce the desired result. With the trainmen themselves, however, it takes more than mere meetings at which some official talks to obtain the necessary interest. Letters to the men at their homes have produced better results than notices posted on bulletin boards. These letters, if followed up with individual instructions, soon get the men into such a frame of mind that some good merchandising can be done. Suggestion sheets for improvements in service and equipment should also be mailed to the trainmen, instead of being left where they can be had when wanted. Such a time never seems to come, but if the sheets are sent to the homes they are more likely to be used. If the men's suggestions are used the writer should be so notified.

Other means of enlisting the aid of employees outlined at the meeting were noonday talks, posters at division points and issuance of pamphlets. The spoken word, however, was considered to be by far the best method if the speaker had a message that his audience wanted to hear. An indirect means of accomplishing some good results is the company publication, which can be read at home.

Discussion also brought out that the electric railways should participate in all community activities supported by civic organizations that benefit the territory served. Advertising through the local boards of trade and chambers of commerce where community affairs are largely discussed by all interested are also indirectly of much benefit.

Letter to the Editors

Baltimore Wants Separate Entrances and Exits with One-Man Cars

UNITED RAILWAYS & ELECTRIC COMPANY

BALTIMORE, MD., May 19, 1921.

To the Editors:

While not desiring to enter into a controversy concerning the merits of the present standard Birney safety car, there is one point that seems to me has not been given due emphasis in the discussion that has taken place. This is the fact that because a car will operate in smaller places, such as Terre Haute or some medium sized city in the Southwest, it does not mean that it is the most efficient design for operation in larger cities, under the conditions of heavy traffic which exist there.

The best proof of the need for another design of a one-man car with more adequate passenger interchange facilities is actual operation. Here in Baltimore we equipped one heavy transfer line with one-man safety cars of standard design, and increased the service 50 per cent when the new cars were put on. These cars replaced a single-truck car, seating thirty people, equipped with longitudinal seats and with 5-ft. platforms. Notwithstanding the greatly improved service furnished with the safety cars, we found it necessary to lengthen the running time during the peak hours in order to keep the cars on time.

There has been some complaint on the part of the public, particularly during rush hours, because of the delays due to loading and unloading the cars, to the narrow platforms and to the congestion that inevitably occurs at the front of the car. This latter was intensified because many people were using the car for short transfer rides and would not go to the rear, because they wished to alight a short distance from where they boarded.

We feel that the one thing that made the car at all successful was the large increase in service. This "acid test" proved to our satisfaction that under such conditions of heavy traffic the present design of the one-man car is not adequate. Therefore, when we recently purchased ten additional cars, we specified a wider platform which provided separate exit and entrance passageways in order to prove out our ideas, and if these cars operate as we feel they will, future one-man cars on this property will be provided with the wider platforms.

Thus it will be seen that in order to consider the public and to give it efficient, satisfactory service the present type of standard one-man car was not adequate. Further, we of the industry should be careful not to jeopardize the great advantages of one-man car operation and risk the possibility of losing these advantages through failure to please the public, just because of the arguments being put out at present for holding to a single design, without recognizing the fact that this design is not suitable for all conditions of electric railway traffic.

L. H. PALMER,
Assistant to President.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Wages Cut in Cincinnati

Eighteen per Cent Reduction Effective July 1 Accepted by Trainmen at Referendum

An agreement was recently entered into between the Cincinnati (Ohio) Traction Company and its union employees, members of the Amalgamated Association, whereby an 18 per cent reduction in wages will go into effect on July 1. Readjustment to the new basis was accepted by the men by a vote of 832 for and 606 against.

The new contract will expire on June 30, 1922. The new and the old rates of pay in cents per hour follow:

Motormen and conductors	Present	Effective July 1, 1921
First three months....	54	45
Next nine months....	57	48
Thereafter	59	50
Curve cleaners	45	32
Car tenders	45	32
Watchmen	45	30
Electric shovel operators	65	52
Barn men, uniform reduction of 20 per cent		
Time and one-half for overtime, both periods		

There were no important changes in working conditions, except that the men have heretofore been paid at the rate of twelve minutes' time for each accident report made out. Under the new contract they will not receive any additional time for this.

The new arrangement was made following conferences attended by W. Kesley Schoepf, president of the railway; officials of the local union and W. D. Mahon, president of the Amalgamated Association. In connection with the agreement it is significant to note that the contract was entered into voluntarily and without arbitration more than a month before the old contract expired.

LARGE SAVING MADE

It is estimated unofficially that the new scale will save the Cincinnati Traction Company a total of between \$400,000 and \$500,000 in wages in a year. The deficit which has accumulated under the present franchise up to May 1 is \$806,427, according to figures of W. Jerome Kuertz, Street Railway Director. Under the terms of the franchise fares cannot be reduced until this deficit is wiped out and a surplus of \$650,000 has been built up. The railway has a fund of \$400,000 held inviolate which would be applied to accumulation of the \$650,000 surplus. Therefore, before fares can be reduced the company must gain \$1,056,427, or \$250,000 plus the deficit of \$806,427.

"It is indeed gratifying to see such a manly expression from the carmen," said W. Kesley Schoepf, president of

the traction company, in commenting on the action of the union men.

Street Railway Director Kuertz said that he had been working and will continue to work for a reduction in fares. "I am conducting an investigation and have found that wages are a large factor in the proposition," said Mr. Kuertz. "But there are many other considerations. For instance there was a considerable falling off in the number of car riders in April of this year compared with April of 1920. There also has been a reduction in the cost of material such as coal."

Service-at-Cost Grant Upheld

The validity of the Findlay service-at-cost ordinance has been upheld by Common Pleas Judge William F. Duncan at Findlay. The Toledo, Bowling Green & Southern Traction Company was granted the franchise by the Findlay Council last February.

Attorney George H. Phelps attacked the franchise in the court.

Judge Duncan held that the city had relinquished none of its rights under the new grant.

The City Street Railway Commission also issued a statement to the public informing riders that unless traffic increases in the next month fares would automatically jump from 8 to 9 cents.

The stabilizing fund which was originally set at \$20,000 has now a balance of \$17,486. The April deficit was \$1,654. The ordinance became effective on March 17.

In April, 1921, there were 2,000 riders daily as compared with 2,900 in April last year.

Ten-minute service was put into effect with the new ordinance and it is possible that the commission may cut service to twelve minutes if the traffic slump continues.

City Construction with Private Operation Suggested

John W. Shartell, owner of the railways in Oklahoma City and Tulsa, Okla., told the City Club at Tulsa that the only hope for improvement in service and needed extensions was in municipal ownership, as the company could not hope to build extensions or otherwise improve the service. It will cost \$5,000,000, he said, to build the Tulsa street railway up to the needs of the traffic. He advocated an immediate bond issue of \$1,000,000 for railway extensions to be built by the city, explaining that the lines so built could be leased to the traction company for operation.

Another Settlement Proposed

Banker Makes Concession Looking Toward Rehabilitation of Company at New Orleans

C. C. Chappele, representative of the junior security holders of New York, interested in the New Orleans Railway & Light Company, has been in New Orleans for several days in conference with Mayor McShane and the City Commissioners trying to work out a plan whereby the traction company may be refinanced and rehabilitated. He is accompanied by W. W. Harris, an expert on public utility matters. Mr. Chappele is for any plan that will stabilize the securities of the company and restore its credit.

Mr. Chappele has sought to stress three points which he regards as essential of achievement if the city's railway troubles are to be settled. The first of these is a fair valuation; the second, a fair return; and the third and last, reorganization on lines that will instill confidence and enlist the aid of capitalists who might be induced to advance the money necessary to rehabilitate the property.

He deprecated any settlement by the courts which might lead to delays even if it placed a higher valuation upon the property than had been fixed by the citizens' committee of forty. The valuation by this body was \$44,700,000. Mr. Chappele believed that this valuation did not represent the true value of the property, but said he would be willing to accept that amount and would recommend it to his principals as the minimum.

It was his honest opinion, however, that the property was worth \$50,000,000 and he felt confident that, if the matter were left to the courts for adjudication, the valuation would very likely be fixed at \$60,000,000. His belief was based upon the decisions of the courts in similar cases in the recent past.

The several conferences held by Mr. Chappele with the Mayor and Commissioners disclosed the fact no proposition would be entertained which did not give promise of lower fares and reduced gas and electric light rates. Mr. Chappele promised to prepare a statement for the Commission Council which would show the effect of the drop in the cost of labor and material upon the operating expenses, since Commissioner of Finance Murphy declared he would not commit himself to the \$44,700,000 valuation until shown that the fare and rates for gas and light would be affected by the fall in the price of labor and material.

It has since been disclosed that the

plan submitted to the Commission Council on May 20 by Mr. Chappelle contemplates the formation of an entirely new company. The plan adheres to the valuation placed upon the property by the citizens' committee of forty which was acceptable to the Eastern bankers at an 8 per cent return. The bankers had signified their willingness to accept a 7 per cent return, but the Council at that time was unwilling to consent to either that return or the valuation.

Mr. Chappelle declared in his statement to the Council that nothing less than an 8 per cent return will be feasible to work out the tangle in which the company now finds itself and is of opinion that the courts, if left to adjudicate the matter, would give a higher rate of interest than was fixed by the committee of forty.

This plan, Mr. Chappelle indicated in his report to the Council, would attract the capital desired to rehabilitate the company and would make ultimately for lower fares. The Commission Council decided to postpone consideration of the matter until May 23.

The city of New Orleans has been afforded an opportunity of carrying up its case against Receiver O'Keefe, who enjoined the Commission Council from interfering with the collection of the 8-cent car fare. Judge Clayton, who issued the injunction, has granted the city an appeal from the order. The case will now go to the United States Circuit Court of Appeals.

Injunction Denied to City

Justice McAvoy in the Supreme Court has denied the application of the city of New York for an injunction restraining the new Public Service Commission from taking office. The court's decision upholds the State law under which the Governor appointed the transit board, and permits the new members to take possession of their offices, which had been denied them by the old board.

The injunction, brought by Corporation Counsel John P. O'Brien in behalf of the city, sought to prevent the Governor's appointees, headed by Commissioner George McAneny, from taking charge of public service affairs.

Justice McAvoy, in the course of his decision, said:

The complaint grounds its demands for the inhibition of the injunctive process upon an allegation that the Transit Commission, these defendants, are about to and will grant under the pretended consents in the form of contracts which they will make for and in the name of the plaintiff with various street railroad companies and said contracts will purport to relieve the companies from the obligation of compliance with the provisions and conditions and obligations theretofore imposed, and that these defendants will modify and alter provisions and conditions of the contract and restore and validate rights of operation which the local authority, for instance now the Board of Estimate and Apportionment, has forfeited, and that such acts will result in irreparable financial injury to the plaintiff, its people and inhabitants unless thwarted by judicial order. The imminence of danger of the execution of contracts that will violate the city's prescribed constitutional rights cannot be before the court for even an examination of the legality thereof until they are proposed to be executed.

Twenty-three Hurt on Washington Interurban

A head-on collision between a passenger train and a work extra on the Washington, Baltimore, & Annapolis Electric Railroad at Ferndale, Md., on May 5, resulted in the death of one employee and the injury of ten passengers and thirteen employees. After investigation of this accident, the chief of the Bureau of Safety of the Interstate Commerce Commission reports the following conclusions:

This accident was caused by work extra No. 7 being operated against train No. 339, an overdue superior train, without proper authority, for which Conductor Johnson and Motorman Dyson are responsible.

The statement of Conductor Johnson indicates that in some manner he and Motorman Dyson reached the conclusion that inasmuch as the train leaving Baltimore at 2:20 p.m. had passed, the next south-bound train they would have to meet would be the train leaving Baltimore at 3:20 p.m., both of them overlooking train No. 339, which was scheduled to leave Baltimore at 2:50 p.m. This accident could have been avoided had either of these employees consulted the time table before proceeding northward from Marley, for they would have seen that the train scheduled to leave Baltimore at 2:50 p.m. was operated daily.

At the time of the accident the crew of train No. 339 had been on duty a little more than ten hours, after about 11½ hours off duty. The crew of work extra No. 7 had been on duty about 8½ hours, previous to which the members had been off duty twenty-one hours or more.

\$1,000,000 for Storage Yard at Boston

The Boston (Mass.) Elevated Railway is constructing an elevated train storage yard at Forest Hills, the southern terminus of the main trunk line elevated road. The present stub-end double-track line, which ends about a train length beyond the Forest Hills Terminal Station, is being extended across the junction of Washington and Walk Hill streets, onto private land purchased by the company. Here the structure will branch out into one four track section and one three track section.

Only the three track section will be



TWO TRAINS OF THE WASHINGTON, BALTIMORE & ANNAPOLIS LINE COLLIDED AT FERNDAL ON MAY 5

The line on which the accident occurred, at present extending between Short Line Junction and Annapolis, was taken over by the Washington, Baltimore & Annapolis Electric Railroad on March 16, 1921, and a contract was made six days previous thereto for the installation of an automatic block signal system between the two points. The opinion of the commission is that had such a system been in use at the time of the accident, the collision undoubtedly would have been prevented.

Conductor Johnson was employed as a brakeman in 1918, promoted to extra motorman and extra conductor in January, 1919, and to freight conductor in April, 1919. On Sept. 20, 1919, he failed to observe an order and ran by a meeting point. Motorman Dyson was transferred from the shop department to the transportation department in March, 1914, and assigned to service as an extra motorman and inspector. His record is clear.

built at the present time, but the leads are being installed for the four track section. On this latter, it is planned also in the future to construct a 500-ft. house, for an inspection shop and minor emergency repairs.

The immediate work on hand contemplates the completion of three storage tracks with a total capacity of eighty standard elevated cars. The estimated cost is \$660,000, for the immediate work, and about \$1,100,000 for the entire job, including the house. The latter will be of brick and concrete construction, on a steel framework. The ground floor below the structure will serve as a basement for the storage of supplies, and will be connected with the surface car tracks.

Capital for this improvement is coming from the money made available by the State purchase of the Cambridge subway, and the expenditure has been approved by the Massachusetts Department of Public Utilities.

Employees Approve 15 per Cent Wage Reduction

Employees of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., at a recent meeting voted on the compromise proposition of a 15 per cent wage reduction offered by the company and the vote was carried by a substantial majority. The men had previously rejected two proposed wage reductions. In accordance with its contract, the company notified the men that on May 1 the agreement was to be opened up. A proposition was then made to reduce the wages of all employees 20 per cent, all rules and working conditions to remain the same.

After the men had flatly rejected this proposition the company made a compromise proposition, offering a wage cut of 15 per cent. This was also rejected. The company then notified its employees that it was willing to put the matter up to arbitration and that the original plan of 20 per cent reduction would go into effect on May 1, subject to award by the arbitration board retroactive to May 1. Soon after this decision the committee representing the men asked for a further conference, stating that they would call a special meeting and ask the employees to reconsider their former action. It was at this special meeting that the proposition of a 15 per cent reduction carried.

Order Attacked Directing Terminal Improvement

The Pacific Electric Railway, Southern Pacific Lines and Los Angeles & Salt Lake Railroad have asked for rehearings with the Railroad Commission on its recent passenger terminal order, declaring that the tendency of the order is confiscatory, that it was apparently prepared in a hasty manner, that it intermingles and confuses their separate interests, and calls upon them to participate in a colossal improvement which, they insist, only Congress can bring about.

In case the application for a rehearing is denied by the commission the railroads state that they are prepared to ask the State Supreme Court for a writ of review. If the State Supreme Court should uphold the order of the commission, the next step will be to ask the United States Supreme Court for a writ of error. It is stated that it is not unlikely that some of the railroads will ask for a Federal injunction against the commission's order.

The Pacific Electric Railway objects to the order, its officials say, because it requires the company to participate in the construction of a union passenger terminal, and it looks with disfavor upon the commission's requirement to the effect that it pay for a separation of grade crossings at the Macey Street and Seventh Street crossings, declaring that it has no property there and that other roads should bear the expense.

The attack of the Southern Pacific upon the commission's order declares such authority lies only with the Inter-

state Commerce Commission. The Pacific Electric petition is based upon jurisdictional and constitutional grounds, challenging the authority of the Railroad Commission to order payment by the railway for work in which it has no interest and where it will not be required or permitted to use the new facilities.

The order of the commission directing the expenditure of \$32,000,000 in terminal improvements at Los Angeles was reviewed in the *ELECTRIC RAILWAY JOURNAL* for May 7, page 868.

Legislative Inquiry Completed

Massachusetts Railways Absolved—Evidence to Go Before District Attorney

The special committee of both houses of the Massachusetts Legislature which has been investigating alleged irregularities in connection with the passage of street railway relief bills in 1918 and 1919 has filed its report. In all, thirty-eight members of the legislatures of those two years were found to have purchased securities of either the Massachusetts Electric or the Boston Elevated Railway companies at various times during those years. Of these, a number opposed and voted against the bills, but apparently felt sure they were certain to pass.

The two companies were entirely absolved from the insinuations that were made before and during the hearings that they had led the members of the legislature to speculate in the stocks of the companies with a view to influencing their votes, or that the companies or anyone representing them, had used any improper influence to secure favorable action on the bills. Allegations were dismissed that there was a "slush fund" raised and used for purposes of corrupting legislators.

The committee consisted of two senators and three representatives, none of whom was a member of the 1918 Legislature, although one was a member of the following year's body, it being determined to include that year's transactions in the investigation, after the committee had been appointed. Four of the committee were Republicans and one a Democrat. The report was unanimous as far as the main findings were concerned and was signed by all members of the committee, but the Democratic member filed a minority report dissenting from some of the conclusions.

The report recommended that copies of the evidence brought out in the hearings be transmitted to the District Attorney of Suffolk County, for such action on his part as he feels advisable. There was no censure offered for those members who had speculated in the railway stocks, nor was there any recommendation for the expulsion of those still serving in the Legislature, as had been expected. The committee took the ground that being a joint committee it had no right to recommend to

either house what action each should take with its own members who were involved. It is expected that each branch of the Legislature will take up this matter on its own account.

Claims were refuted that the bill authorizing the purchase of the Cambridge Subway by the State from the Boston Elevated was a "steal," and that the \$7,868,000 paid for it went into the pockets of "State Street financiers." The evidence showed that the money paid by the State is being legitimately devoted to capital improvements by the trustees of the Elevated, under the control of the Public Utilities Board. As the expressed and understool purpose of the purchase was to provide capital for the trustees to use for necessary improvements, no criticism is attached to anyone on this score. It was shown that the rental being paid to the State by the company for the use of the subway, not only pays the interest on the State's investment, but also provides a sinking fund, which will ultimately retire the whole indebtedness, and leave the commonwealth the owner of the subway without cost to itself.

The committee recommended that the Legislature adopt a joint rule which will clearly define the rights and duties and members hereafter, with regard to purchase or ownership of stock in corporations, when legislation affecting them must be voted on.

Ten-Cent Cut in Toledo

Union Insists on Arbitration Although Matter Would Appear to Be Self-Adjusting

After more than a month of parley in which time the employees of the Community Traction Company at Toledo, Ohio, turned down one offer of a wage cut of 2 cents an hour from their maximum of 60 cents, company officials put into effect a reduction of 10 cents making the scales 45, 47 and 50 cents beginning May 23. The union submitted to the cut only on consideration that the disputed wage question shall be arbitrated according to the terms of the Milner service-at-cost ordinance.

Frank R. Coates, president of the railway, declared that he saw no need of arbitration, under the terms of the ordinance, which provides that all salaries and wages shall be based on rates prevailing in other cities. He put the matter before the board of control for final action as to whether or not arbitration should be resorted to.

Edward McMorro, member of the executive board of the "Amalgamated," who has been spokesman for the union men, said:

The union will accept as a maximum wage any award of the board of arbitration over the offer of 50 cents an hour.

This proposition is regarded as so ambiguous that it is doubtful if the board of control will go to the mat on such a question. If the board should agree to open up the whole question of wages company officials believe that

they will be able to secure a larger cut than is made in the proposed scale.

The cut in wages is only 18 per cent as compared with cuts of 20 per cent in Cleveland and Detroit, the rates in which cities have always governed Toledo wages on a differential basis.

Many of the working conditions forced into agreements during the war period are also omitted from the proposed agreement at Toledo. Two weeks' vacation with pay is also cancelled and special provisions for overtime rates and runs are also changed.

The board of control and Street Railway Commissioner W. E. Cann have taken no part in wage negotiations up to this time and it is possible that they may decline to step into the controversy unless the interest of the public is at stake.

By dating of the wage contract from May 21 rather than April 1, the Toledo negotiations now follow those of Cleveland and Detroit.

The 1920 wage rate was 54, 56 and 60 cents. The new scale is 45, 47, and 50 cents an hour. Common labor rate in Toledo is now 35 to 45 cents an hour.

Wage Reduction Accepted Gracefully

Foregoing their contract with the company in order to accept a reduction in wages, motormen and conductors of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., have accepted a voluntary reduction in wages of 5 cents an hour, retroactive to May 1. The pay will now be 66 cents an hour. The men's old contract had some time to run.

About a year ago, when the wage was 54 cents an hour, the company set aside its contract with the men in order to increase their wages to 71 cents an hour. The interurban line is headed by David J. McCahill, and the employees said they took the cut in appreciation of the treatment accorded them by the company and its president.

On the men's initiative the reduction was made retroactive to May 1, although President McCahill said he would be satisfied to have it begin May 16. They also offered to take a greater reduction if it should prove necessary. Approximately 450 men are affected.

The employees of this road operate under a plan which provides for their participation in the profits of the company different from most other plans of the kind. This plan was described at length in the *ELECTRIC RAILWAY JOURNAL* for March 27, 1920, page 664.

Approves of One-Man Cars.—The Rhode Island Company, Providence, R. I., has received authorization from the Public Utilities Commission to operate one-man cars in Woonsocket and Pawtucket. The petition was made after President Wood, of certain Bay State lines, notified the Rhode Island Company that one-man cars would be run over their lines into the cities of Woonsocket and Pawtucket.

New Home for Railway

Company at Los Angeles Will Soon Occupy Top Five Floors of New Structure

Up-to-date architectural and engineering features are embodied in the new building of the Los Angeles (Cal.) Railway at Eleventh Street and Broadway, into which the company is now moving. The structure is of class "A" reinforced concrete construction.

The building is 176 ft. long and ten stories high. It has the greatest area of frontage on Broadway of any building in the city. It is of "flatiron" type, measuring 65 ft. on the south end, which fronts on Eleventh Street, and 30 ft. on the north end. The center of this north end is on the center line of Broadway extending from the tunnel at Temple Street to Tenth Street and affords an impressive view down the main artery of Los Angeles.



LOS ANGELES RAILWAY'S NEW HOME

A granite base supports the two lower stories of terra cotta and the six-story shaft of brick exterior extending to the ninth floor. The two top stories have a terra cotta finish with colored decorative pilasters and figureheads at the four corners of the building. The main supporting columns of the building are 28 in. and 30 in. square.

The main floor will be devoted to stores. The second to fifth floors will have general offices and the Los Angeles Railway will use the top five floors. Several features particularly adaptable for the railway are included in the architecture.

There will be no assembly room for lectures, with blackboards, maps and other equipment to be used by the instruction department.

The railway's library for employees will be on the sixth floor. The medical department will be equipped for using an X-ray machine and other modern electrical equipment of the profession. A specially constructed sound-proof room will be used by the auditing department for the punching and sorting machines.

Occupancy of the new building will centralize the offices of the railway, as the instruction department is at present located at Sixth Street and Central Avenue. This will leave only the five carhouses, the shops and electrical construction and repair department outside the main offices. Noerenberg & Johnson are the architects.

\$200,000 for Improvements

Federal Judge English, sitting in East St. Louis, Ill., has approved an appropriation of \$200,000 for the betterment and replacement of property of the Alton, Granite & St. Louis Traction Company, after a personal inspection of the company's property made with W. H. Sawyer, Fred Allen and C. B. Thomas, receivers for the company. Of the appropriation \$80,000 will be used for repair work and the purchase of one-man cars for use in the city of Alton. A new bridge, costing \$15,000, will be built at Woodriver, Ill. Judge English recently made permanent the temporary receivership under which the company has been operating.

Disorder Rife in Albany

After perhaps the worst outburst of rioting and violence since the beginning of the strike waged by the employees of the United Traction Company, Albany, N. Y., quiet and order again prevailed on May 23 with the state troopers and the city mounted police patrolling the business zones. Both day and night service has been resumed by the railway.

The riots on May 19 and 20 followed a recent campaign to oust the jitneys from the streets. This campaign instituted by police authority proved unpopular and as a result the cars were battered with flying rocks and stones and the non-union crews had to desert their posts for safety. Though police reserves were immediately summoned and troopers from Troy were rushed to the scene, several persons were injured and many cars were wrecked before order was restored.

Frankford Lease Probably Best

Director Twining of the Department of City Transit, Philadelphia, Pa., at a recent hearing submitted to twenty-eight questions put by E. E. Ziegler, president of the North Philadelphia Business Men's Association, on the proposed temporary lease of the Frankford elevated and Bustleton surface lines to the Philadelphia Rapid Transit Company. The director declared that the lease as now drafted would not hold up the operation of the Woodland Avenue line and the Chestnut Street subway. He said further that the lease was in fact only a compromise, but that it was the best that could be arranged. Mr. Twining emphasized the fact that the lease under consideration would be rewritten after the Public Service Commission had determined on the Philadelphia Rapid Transit valuation.

Additional Transit Acts Approved

Governor Miller of New York on May 6 signed two bills relating to New York City transportation matters. One was the Burling measure, which authorizes the creation by the Westchester County Board of Supervisors of a commission of seven members to arrange for improved transportation service by railroad or electric railways between New York City and points within Westchester County.

The other bill is the Walker measure which amends the rapid transit act with reference to payment for work done. This measure is aimed to meet conditions which may arise as a result of the eventual adoption of the unified system which is to be created by the new transit commission. It provides that where the Rapid Transit Commission shall have failed to certify a voucher for the payment of money a proper or sufficient voucher shall not be a condition precedent to the liability of the city.

\$1,643,000 to Be Spent in Portland

The Portland Railway, Light & Power Company, Portland, Ore., announces that reconstruction work, improvement, extension and maintenance either now under way or already authorized and ready to be undertaken in the near future will entail expenditures of between \$1,500,000 and \$2,000,000. The following projects are included in the exhaustive plan for 1921:

New steam turbine of 12,500 kilowatt rated capacity installed in Station "L," work now under way	\$400,000
Replacement of 50,000 ties on lines of the Interurban system, now under way	75,000
Bridges and buildings and maintenance work on the Interurban system, now under way	150,000
Maintenance of way work on the Portland city car lines, now under way	350,000
Reconstruction and repaving of car tracks on First Street, from Alder to Madison	36,000
Reconstruction and repaving of Third Street from Washington to Gilsan, authorized	52,000
Reconstruction and repaving of East Twelfth Street from Hawthorne Avenue to Milwaukee Avenue, contract let	36,000
Reconstruction and repaving of Woodward Avenue from Grand Avenue to East Tenth Street, now under way	20,000
Reconstruction and repaving of Vista Avenue from Spring Street to Patton Road, just completed	14,000
Repaving on Main Street, Oregon City, under way	5,000
Rebuilding trestle on Oregon City line, under way	4,000
Repairing and repainting over 50 stations and waiting-rooms on the various Interurban lines, now under way	5,000
Reconstruction and repaving of Killingsworth Avenue from Interstate Avenue to Greeley Street in prospect	57,000
Reconstruction and repaving of Ravensview Drive from Greenway Drive to Elizabeth Street, in prospect	20,000
Reconstruction and repaving of East Lincoln Street from East 54th to East 57th Street, in prospect	16,000
Reconstruction and repaving of Twenty-seventh Street from Thurman to Upshur Street, contract let	3,000
Other work	400,000
Total	\$1,643,000

News Notes

Franchise Negotiations Renewal.—The conferences have been renewed looking toward the drafting of a new franchise for the Grand Rapids (Mich.) Railway. At a recent session General Manager De Lamarter is said to have been inclined to the insertion in the franchise of a four-tickets-for-a-quarter proviso with a charge of 10 cents for transients, until the company has made good its accumulated losses from operation.

May Establish Car Service.—The Interstate Electric Corporation, which owns the San Angelo (Tex.) Water, Light & Power Company, plans soon to establish railway service in that city. This report is given credence by the placing of an order by the San Angelo Water, Light & Power Company for a 500-hp. oil-burning engine and electric generator. The new equipment will double the capacity of the San Angelo plant.

Minneapolis Veterans Organize.—The Veterans Club has been organized by old-time employees of the Twin City Rapid Transit Company, Minneapolis, Minn. One hundred and thirty-four men who had been more than twenty-five years in service were present at the first meeting. Nels J. Nelson, claim adjuster, was made chairman and F. A. Anderson, social service director, was temporary secretary. A committee was appointed to draw up the constitution and its members will be directors for the first year.

Investors Will Be Protected.—Each employee of the Beaver Valley Traction Company, New Brighton, Pa., and the Pittsburgh & Beaver Street Railway, Pittsburgh, Pa., recently received a notice from General Manager Boyce reminding the employee of the "Pull Together" motto of the company which makes each employee a booster of his company, fellow workers and management officials. Every man is urged to defend the company in a courteous manner and to secure the names of people who make erroneous statements about the company, and the management will be glad to send a letter or have an interview with such complainants to inform them of the truth. The manager announces that for the first three months of this year the Pittsburgh & Beaver Street Railway and the Beaver Valley Traction Company had a combined loss of \$6,845.

Funds Needed for Transit Facilities.—E. W. Edwards, president of the Rapid Transit Commission, Cincinnati, Ohio, at a recent meeting before the business men of the city declared that a bond issue of \$3,000,000 in addition to the amount paid by the abutting prop-

erty owners would probably go before the public at the August primary election for the purpose of boulevarding the canal. He discussed the outlay of funds of the commission and just what accomplishments were expected. He said that the operation of the loop by the Cincinnati Traction Company would mean many years of court action and that the commission had decided to go ahead with the work on the canal and leave the question of operating until such time as the traction company had reduced fares to a lower limit. Speaking on the cost of the rapid transit system, Mr. Edwards said the commission had spent \$542,000 for property, and that contracts had been let for the first four sections totaling \$2,079,000. Of these contracts, there had been \$977,000 worth of work already completed. This had left the commission a balance of approximately \$3,500,000 with which to push the completion of the loop.

Programs of Meetings

American Institute of Electrical Engineers

The American Institute of Electrical Engineers will hold the thirty-seventh annual and Pacific coast convention at Salt Lake City, Utah, on June 21-24. A tentative program has been arranged, including an address of welcome by Charles R. Mabey, Governor of Utah, and an address by President Berresford. The entertainment program will consist of sight-seeing trips to Great Salt Lake and Salt Lake Valley, where members can inspect a mining canyon. An opportunity will also be afforded the members to see the largest outdoor substation in the world, the property of the Utah Power & Light Company. Various technical papers will be read on each of the convention days.

New York Electric Railway Association

The thirty-ninth annual meeting of the New York Electric Railway Association will be held at the Fort William Henry Hotel, Lake George, N. Y., on June 11. The meeting will convene on the arrival of the delegates who come by the morning train. Reservations so far received far and away exceed the number enrolled for previous years' meetings of the association so long in advance of the date of the meeting. Various subjects will be discussed, special attention being given to the questions of one-man car operation and taxation in its different phases.

The entertainment features for the men will not be started until the conclusion of the business sessions. The ladies will have bridge parties and will enjoy golfing, boating and other outdoor sports such as the territory around Lake George affords.

Requests for hotel accommodations should be made as early as possible to Charles A. Douglass, manager, Fort William Henry Hotel.

Financial and Corporate

\$1,000,000 Lost by Seattle

City Running Steadily Behind in Its Operation of the Seattle Municipal Railway

According to the 1920 annual report of Seattle's superintendent of public utilities, the operating revenue of the Municipal Street Railway showed a gain of 31.4 per cent over the previous year. This increase was due principally to the fact that the 5-cent fare was changed on July 24, 1920, to a 7-cent cash fare with four tickets for a quarter or two cash fares for 15 cents.

Notwithstanding this increase in revenue it was impossible to keep the expenses of operation to less than 102.2 per cent, with the result that the net loss for the year was nearly \$1,000,000. If the previous deficit in the profit and loss account is added the total deficit since the city took over the operation amounts to \$1,236,284. The accompanying tables speak for themselves and show the detail of operation for the past two years.

In referring to the jitney situation the report recommends that some action be taken whereby the system may be regulated and the operators compelled to live up to such regulation.

WOULD BAR JITNEYS

Jitneys, the report says, should not be allowed to operate on the same street

on which car lines are located, as there is a sufficient amount of equipment in the railway department to take care of all travel on any line operated without the assistance of jitneys. There are, however, a few outlying districts which at this time are not served by the Municipal Railway, and in such locations the jitneys could legitimately operate, provided they are compelled to pay a certain percentage of their earnings to the city for the right to operate over the streets, as they are operating simply for the purpose of making money and are not in the same class as a privately owned machine.

Substantial decrease in the number of accidents on the car lines during 1920 as compared with the previous year is shown by the report. The total number of accidents in 1920 was 6,511, as against 7,291 in 1919. The number of collisions with cars, 246; collisions with vehicles, 2,976; collisions with pedestrians, 205; injuries on cars, 317; step accidents, standing cars, 403; derailments, 231, and miscellaneous, 680. There were 106 ejections of passengers for which damage claims were filed and six fatalities among passengers and trainmen against nine in 1919.

The traffic handled during the year was 122,866,577 passengers as against 133,176,297 the previous year. Revenue passengers decreased 9,114,648, while free passengers increased 363,297 and

transfer passengers decreased 1,558,369. To handle this traffic 15,829,054 car-miles in 1,765,635 hours were operated as against 16,162,539 miles in 1,771,138 hours the year before. The average speed of cable cars for the year was 6.47, for electric cars 9.17 and the average for all services 8.97 miles per hour.

\$2,000,000 of Stock to Monongahela Patrons

George M. Alexander, president of the Monongahela Power & Railway Company, Fairmont, W. Va., has announced that \$2,000,000 of preferred stock of the company will be offered to patrons for subscription. The company is the successor to the Monongahela Valley Traction Company, the change in name having been made so as to reflect more accurately the operations of the company.

The preferred capital stock of the company has recently been increased from \$4,000,000 to \$8,000,000. Of the increase approximately \$2,000,000 has been made available for purchase by the patrons of the company in the communities served by it.

In announcing the change in plan Mr. Alexander said in part:

The company in adopting this policy, making it possible for its customers to acquire its stock, feels that the patrons of its railway lines, the users of its power, electric light and gas are entitled to participate in the profits arising from such service for the following reasons:

1. So that the company and the public it serves shall be partners in fact in order that the service rendered shall respond to the demands of the public.
2. So that the actual ownership of the property shall be vested in the people upon whom the company depends for patronage.
3. So that the profits (or wages paid for the use of capital) of the company shall be returned to the people who make these profits possible by their patronage.
4. So that the company and the public may work in closer co-operation for the benefit of the territory served.
5. So that the money obtained from the sale of securities will be used where obtained and will go for purposes that will benefit the entire community.
6. So that the people of these communities may have a sound home investment for their capital and savings.

The par value of this stock is \$25 per share and the patrons may purchase this stock at \$19 per share. The stock pays dividends at the rate of 6 per cent annually on the par value, which makes the return at the above price nearly 8 per cent per annum. The stock may be purchased for cash or on a satisfactory partial payment plan.

Time Extended for Filing Inventory

The Indiana Public Service Commission has extended until June 15 the time in which the Indiana Railways & Light Company must file an inventory with the commission. Last January the commission ordered an inventory filed by March 15, and at the end of that time an extension until April 15 was granted. The company failed to report then and another extension was granted setting the date as May 15. The commission announced recently that it would instruct the engineering department to investigate the company's property and set the final date for filing the inventory as June 15.

INCOME AND PROFIT AND LOSS STATEMENT—SEATTLE MUNICIPAL RAILWAY

	1920	Per Cent of Total Operating Revenue	Per Cent Change Over Previous Year	1919	Per Cent Total Operating Revenue
Operating revenue:					
Passenger.....	\$5,283,658	96.72	31.1	\$4,030,602	96.94
Firemen and police.....	54,000	0.99	42.1	38,000	0.91
Special cars.....	1,698	0.03	260.0	471	0.01
Mail service—postal employees.....	9,388	0.17	51.0	6,213	0.15
Express revenue—newspapers, etc.....	8,770	0.16	122.0	3,948	0.09
Freight.....	39,977	0.73	24.6	32,112	0.77
Miscellaneous transportation.....	1,055	0.02	67.5	3,264	0.89
Auto bus revenue.....	12,218	0.22	4349.0	275	0.01
Total from transportation.....	\$5,410,764	99.04	31.5	\$4,114,885	98.96
Non-operating revenue:					
Station and car privileges.....	17,158	0.300	32.6	12,947	0.31
Rent of equipment.....	105	0.002	96.9	3,523	0.09
Rent of track and facilities.....	24,089	0.400	15.1	20,938	0.50
Rent of real estate.....	96	0.002	98.0	4,638	0.11
Power sold.....	465	0.008	19.7	579	0.01
Miscellaneous revenue.....	723	0.010	12.5	643	0.02
Lost and found department.....	1,680	0.030	.....	.....	.....
Miscellaneous rent revenue.....	8,312	0.150	.....	.....	.....
Total.....	\$52,628	0.96	2.2	\$43,268	1.04
Total operating revenue.....	\$5,463,392	100.00	31.4	\$4,158,153	100.00
Operating expenses:					
Way and structures.....	\$457,105	8.18	61.8	\$282,993	6.93
Equipment.....	734,017	13.16	38.9	528,507	13.00
Power.....	683,934	12.24	22.5	558,528	13.70
Conducting transportation.....	2,644,291	47.45	35.5	1,950,460	48.00
Traffic.....	3,273	0.05	47.0	2,228	0.05
General and miscellaneous.....	362,547	6.49	48.0	245,109	6.01
Auto bus expense.....	22,956	0.41	2437.0	904	0.07
Depreciation.....	677,179	12.12	35.7	499,173	12.29
Total.....	\$5,585,302	100.00	3.73	\$4,067,903	100.00
Gross income.....	121,910	.....	235.5	90,250	.....
Deduction:					
Interest on general bonds.....	35,750	.....	53.5	23,281	.....
Interest on revenue bonds.....	823,000	.....	42.0	579,684	.....
Discount on funded debt.....	6,908	.....	199.0	2,314	.....
Interest on warrants due.....	2	.....	99.9	2,145	.....
Total.....	865,660	.....	42.5	\$607,424	.....
Net income to P & L.....	987,570	.....	91.0	517,174	.....

Deficit Still in Toledo

Pay-Leave Fare Collection Proposed During Rush Hours—Commissioner Building for Permanency

Operations of the Community Traction Company, Toledo, Ohio, for the month of April showed a deficit of \$72,730 after payment of all charges and fund accruals. The total decrease in gross revenue for the month was \$14,229.

Earnings from operation for the month totaled 41.17 cents per car mile. Expenses of operation took 39.3 cents. The balance plus miscellaneous income gives 4.08 cents per car mile to meet taxes, reserves and fixed charges. The total passenger riders per car mile amounted to 8.14 exclusive of employees carried.

The operating ratio was reduced to 90.60 in April from 92.21 in February and 93.25 in March. With the elimination of the Huron Street line it is anticipated that this ratio will be less than 90. The maintenance and repair fund allowance is being arbitrarily maintained at 10 cents a car mile for the summer months.

Street Railway Commissioner McCann has outlined some of his plans for increasing economy. He is conducting operations on a strict business basis and is trying to do justice to the property itself rather than attempting to make a showing during the first few months of operation under the new service-at-cost plan.

During rush hours the pay-leave system of fare collection is to be used on the cars to speed up downtown loading. By having the cars pay-enter in-bound the collection of fares would be eliminated in the congested district.

Safety rules may also be changed to allow loading of more than one car at a time at some of the downtown corners. A plan of complete downtown re-routing so as to separate railway and vehicular traffic is also being developed.

The new rate of 40 cents a car mile for interurban rental has become effective and the commissioner believes he can persuade the interurban companies to build a stretch of track on Jackson Avenue between Huron and Superior

Streets to make a new loop for Detroit-Cleveland cars and several other lines now using a long loop through the congested district. It is estimated that the mileage saved at 40 cents per car mile under the new arrangement would save to the interurbans the cost of the track in less than a year. This plan if carried out would make Toledo's new interurban station approachable from both sides and greatly facilitate the speed of loading and dispatching cars.

Stock Dividend at Detroit

In connection with the stock dividend of 2½ per cent declared on the \$15,000,000 of capital stock of the Detroit United (Mich.) Railway, it has been explained that in view of the abnormal business conditions prevailing the board of directors, notwithstanding the existence of a surplus of many million dollars represented in the value of its properties, deemed it prudent to proceed with extreme caution and to conserve the company's resources in every possible way and therefore decided to declare a stock dividend at 2½ per cent payable on June 1, 1921, in lieu of the usual cash dividend payable at that date.

\$179,000 Loss in Buffalo

The International Railway, Buffalo, N. Y., shows a deficit for the three months' period ended March 31, 1921, of \$179,924 against \$77,822 for the corresponding period of 1920. Operation in 1921 so far presents none too bright a situation. For the two months ended Feb. 28 the company failed by \$300,000 to earn the amount required and at the end of March, as is noted in the accompanying table, the gross revenues are insufficient by \$466,576 to meet operating expenses, taxes, depreciation, etc. Mr. Tulley, president of the railway, in a recent statement announcing a wage cut for unskilled employees effective May 1, spoke of the financial distress of the company. He stressed the industrial depression which had been so acute that a falling off of 17 per cent was noted in the company's gross receipts.

Massachusetts Roads Exempted From Excise Tax

An additional exemption of two years, 1922-23, from the assessment of the so-called commutation or excise tax in Massachusetts has been granted the street railway companies of that state by a bill just passed by the Legislature and signed by the Governor. During the severe financial crisis which confronted the companies two years ago they were relieved from the operation of this tax for the years 1920-21 by legislative enactment, and the present bill is in the nature of a further extension.

There was considerable opposition to the passage of the present extension, and the original bill was defeated. The speaker of the lower branch of the Legislature, B. Loring Young, who is exceptionally well acquainted with street railway financial conditions, himself took the floor on a motion for reconsideration, and so impressed the members with the necessity for continued relief from this tax that the measure was reconsidered and passed.

This tax is levied as a percentage of gross receipts, the maximum being 3 per cent, for the use of the various towns in which the street railway tracks are laid, to pay for maintenance of public ways and bridges. The tax is apportioned among the towns in the ratio of the mileage of track in each one.

Brief Filed in Suit for Restoration

Edward C. Turner, former attorney general of Ohio and now counsel for the Columbus Railway, Power & Light Company, Columbus, Ohio, has filed a brief of 128 printed pages in the suit of the company against E. W. Clark & Company, Philadelphia, Pa., former operating managers of the railway, to recover \$2,737,621 or \$2,655,040 depending upon which of two sets of claims is considered. The brief represents the summation of the controversy that has been in progress almost three years before Common Pleas Judge E. B. Kinkead and Master Commissioner George B. Okey, Columbus.

Mr. Turner charges that the Clarks underwrote and others invested. According to him "Columbus and the surrounding territory are full of suckers." He charges that for a quarter of a century the Clark interests exercised a control at Columbus through the proxy committee—"the very weapon by which they were finally unhorsed." According to Mr. Turner the management of the company was finally taken away from the Clark interests by Charles L. Kurtz, the present president of the Columbus Railway, Power & Light Company, and by D. Meade Massie, Chillicothe, Ohio.

The brief is considered one of the most remarkable documents ever submitted in a suit brought in Franklin County, particularly in a civil suit. It is replete with the reiteration of charges of mismanagement on the part of the former operators. Mr. Turner

STATEMENT OF EARNINGS OF INTERNATIONAL RAILWAY

Three months ended March 31:	1920	1921	Per Cent Change
Operating revenue.....	\$2,418,022	\$2,685,550	10.6
Operation and taxes.....	2,092,841	2,497,489	19.3
Operating income.....	\$325,181	\$188,061	42.4
Non operating income.....	5,092	7,863	54.4
Gross income.....	\$330,273	\$195,924	40.7
Income deductions.....	408,095	375,848	7.9
Deficit.....	\$77,822	\$179,924	131.1
The formula for the determination of a fair return upon the value of the property, adopted by the Public Service Commission when granting the 7c. cash fare—4 tickets for 25c., for the City of Buffalo, represents an annual sum of approximately \$2,650,000. Proportion for three months.....			
Gross income for three months ended March 31, 1921.....		\$662,500	
		195,924	
Amount by which gross revenues are insufficient to provide for operating expenses, depreciation and renewals, taxes, and this return upon the value of the property devoted to the public service.....			
		\$466,576	
The formula for depreciation and renewal adopted by the Public Service Commission when granting the 7c. cash fare—4 ticket for 25c., for the City of Buffalo, represents an annual charge of \$1,016,000, and effective July 1, 1920, the monthly appropriation from earnings has been in accordance therewith.			
Comparative charge for depreciation and renewals for the first three months of 1921 and 1920, as included in "Operation and Taxes".			
	\$99,998	\$254,000	154.5

says that "throughout a busy career covering the trial of many cases where brains were combined to circumvent justice, I have never encountered an abler witness or one who could play a better game of mental chess on the witness stand than Mr. Clark. But truth is mighty and will prevail."

Counsel for E. W. Clark & Company have not yet filed their brief in reply.

Miami Traction Has Quit for Good

The Miami Traction Company, which ceased operating the electric railway in Miami, Fla., following the fire that destroyed its plant, carhouse and some equipment more than a year ago, will "never operate another car in Miami," S. M. Tatum, treasurer of the company, told the Civic Voters League at a meeting which he was invited to address. Mr. Tatum discussed the traffic situation from the standpoint of the company. He did not touch on the latest development—the suggestion that the Carl G. Fisher interests owning the Miami Beach Electric Company take over the franchise and track of the Miami concern.

Mr. Tatum described how the City Council had failed again and again to provide protection for the company from the inroads into the transportation business made by the jitneys, and how at last the Council had refused to call an election on the question of buying the car line although petitioned to do so by the Chamber of Commerce, the Rotary Club, the Real Estate Board and several hundred citizens. It even refused to accept the report favorable to municipal ownership brought in by a committee of citizens appointed under the Council's own direction to investigate the traction situation and make recommendations for a resolution.

The speaker ventured the opinion that no company could be induced to come in and take over the railway franchise unless the jitneys were legislated off the streets. The franchise, he said, is very severe, anyway, and had been looked upon unfavorably by railway operators to whom it had been shown.

The last direct offer made by the company to the city was to sell the tracks to the city for \$75,000, and the cancellation of debts owned by the company to the city. These debts total about \$14,000.

Abandonment Ahead

The critical situation regarding the railway at Lafayette, Ind., took a new turn recently when it was announced that the Northern Indiana Gas & Electric Company has bought the railway's power plant at the foot of South Street and had taken an option on the car lines, effective until June 10.

Clarence H. Geist, president of the Northern Indiana Company, has conferred with George R. Durgan, Mayor, and the members of the Board of Public Works and told them that his company had persuaded the Terre Haute, Indianapolis & Eastern Traction Com-

pany to take over the railway lines and operate them as lessee providing the city will guarantee the company protection from the competition of jitney buses.

The alternative to the offer made the city by the Northern Indiana Gas & Electric Company and the Terre Haute, Indianapolis & Eastern Traction Company is complete abandonment of the railway. The Northern Indiana Company plans to dismantle the power plant and take over its business at the newly enlarged power station of the Northern Indiana Company. The plan is to have the railway buy power from the Northern Indiana Company.

Financial News Notes

Short Abandonment Approved.—The Board of Public Utility Commissioners of New Jersey has granted permission to the Millville Traction Company to abandon 0.8 of a mile of track and relinquish the franchise on South Second Street, Millville, at the end of the line.

Cannot Abandon Service.—The State Public Utility Commission recently refused permission to the Bridgeton & Millville Traction Company, Bridgeton, N. J., to cease operation on its line between Newport and Bivalve. Vigorous opposition was voiced to this abandonment by residents along the route.

Westford to Contribute to Railway.—The town of Westford, Mass., has secured authority from the Massachusetts Department of Public Utilities to contribute the sum of \$1,829.23 toward the cost of operation and the fixed charges of the line of the Lowell & Fitchburg Street Railway within the limits of that township.

Successor Company Chartered.—The Abilene (Tex.) Traction Company has been chartered with a capital stock of \$100,000 to take over the property of the old traction company which failed and which has not been operated for two years or more. The incorporators of the new company are J. N. Burjac, Price Campbell and G. W. Fay.

Sale Under Foreclosure Restrained.—The sale of the property of the Standard Traction Company, Dallas, Tex., under foreclosure proceedings to satisfy a judgment for \$5,000 obtained by C. F. Farmer and wife in the District Court of Dallas County, has been stopped by the granting of a receivership for the property. This action was taken by Judge W. F. Whitehurst upon application of the Power Investment Company, holder of a first lien for \$10,000 upon the property. George P. Dunlap has been appointed receiver for the company.

\$5,000,000 Milwaukee Bonds Offered.—A syndicate of bankers, including

Dillon, Read & Company, Harris, Forbes & Company, Inc., and Spencer Trask & Company, New York, N. Y., offered for subscription on May 12 \$5,000,000 of twenty-year 7½ per cent refunding and first mortgage gold bonds, series A, of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., dated June 1, 1921, and due June 1, 1941. The offering price was 95 and interest yielding more than 8 per cent. A semi-annual sinking fund will retire 2 per cent per annum of the bonds until June 1, 1926, and 1½ per cent per annum thereafter if obtainable at or under par and accrued interest. The trustee of the issue is Central Union Trust Company, New York. The bonds become a first lien on the company's entire property by Dec. 1, 1931.

\$1,500,000 of Portland Bonds Offered.

—The National City Company, New York, N. Y., is offering for subscription at 96 and accrued interest, yielding more than 7.85 per cent, \$4,500,000 of first lien and refunding mortgage gold bonds of the Portland Railway, Light & Power Company, Portland, Ore. The bonds are dated May 1, 1921, and are due May 1, 1946. Interest is payable May 1 and Nov. 1 at the office of the National City Bank, New York. The bonds are known as series A and bear interest at the rate of 7½ per cent. The net earnings of the company are said to be more than twice the annual mortgage bonds interest charges. Associated with the National City Company in offering the bonds was Halsey, Stuart & Company, Inc., New York. The bonds were advertised for public subscription in the newspapers of May 13. In the advertisements it was explained that the Portland City Railway system is showing a substantial earning power and that the Public Service Commission of Oregon had valued the properties of the company at a figure which was more than 150 per cent of the outstanding mortgage debt including the present issue.

Southern Indiana Bonds Offered.

—The National City Company, New York, N. Y., is offering for subscription \$1,000,000 of first lien and refunding mortgage gold bonds of the Southern Indiana Gas & Electric Company, Evansville, Ind., the successor to the Public Utilities Company. The subscription price is 94 and accrued interest, yielding more than 8.10 per cent. The bonds are dated April 1, 1921, and are due April 1, 1941. The company owns and operates without competition the electric light, power, gas, street railway and steam heating properties in Evansville. It also does electric light and power business in nearby communities and operates an electric interurban railway. The bankers say that on the basis of appraisals by independent engineers the replacement value of the property is substantially in excess of the present mortgage debt of \$5,630,000. The equity is represented by \$335,000 of 6 per cent debenture bonds, \$2,527,300 of outstanding preferred stock, and \$3,000,000 of common stock.

Traffic and Transportation

Jitney Regulation Attacked Operators Appeal to State Supreme Court in Effort to Nullify City's Ruling

The Supreme Court of the State of Washington set May 19 as the date for hearing the appeal of the Seattle jitney drivers from the verdict of the King County Superior Court subjecting them to regulation by the City Council. A decision is not expected, however, for sixty days, the time usually elapsing between hearing and ruling. The city was represented by George A. Meagher, city attorney in the litigation that developed last summer, when the city attempted to enforce an ordinance submitting the jitneys to drastic regulation. He argued the case before the higher court. As the case involves the city's rights to exercise police powers municipal officials are confident they will win.

Under an ordinance passed a year ago the city forbade operation of jitneys except under licenses, subject to conditions which the jitneys alleged virtually made it impossible for them to continue running. The jitney operators sued for an injunction in the Superior Court to restrain the city from enforcing the ordinance, but the injunction was denied. An appeal was taken, and operation of the ordinance has been suspended pending the appeal, the jitney buses running without municipal supervision.

Under the ordinance requiring permits a majority of the members of the City Council last summer showed a disposition to keep all the jitneys off the streets, refusing licenses except to a few drivers, and curtailing their runs to routes that would serve as "feeders" to the municipal railway.

Ten-Cent Plea May Be Renewed

Upon motion of Judge C. P. McIntyre, special counsel for the city of Montgomery, the Public Service Commission of Alabama recently granted a rehearing of the original petition of the Montgomery Light & Traction Company for authority to advance fares to 10 cents and institute a service-at-cost plan.

May 17 was set as the date for the rehearing for the traction company and the city of Montgomery to submit further evidence in connection with the petition of the company, but this date was later changed. The petition of the company has been so amended that should the public service body finally decide it has no jurisdiction in the matter of granting a rate that will create a reserve fund for the company application will be made for a straight fare of 10 cents, or such a fare as the

commission may decide is a fair and just return on the company's investment.

Ray Rushton, receiver of the railway, addressing the commission in behalf of the company, stated he was surprised that the commission had "thrown the original petition out of court" on what he termed a "technicality." A. G. Patterson, president of the commission, replying to Mr. Rushton, reiterated the commission's position that it had no jurisdiction in the establishment of the proposed service-at-cost plan. Mr. Rushton then stated that if the commission felt it was not authorized to pass upon the service-at-cost plan then he, as receiver for the company, would ask the commission to authorize a fare of 10 cents or whatever amount the commission may decide is a fair return on the investment of the company. He added, however, that he hoped the service-at-cost plan would receive the commission's endorsement, and referring to the 10-cent fare stated it is now in operation in 120 cities in the United States.

Three Cents a Mile Fare Granted for Fast Line

The Public Service Railroad, Newark, N. J., operating the so-called fast line, was allowed a three-cents-a-mile fare on May 20 by the Public Utilities Commission. The present minimum fare of 10 cents was continued.

The board held that inasmuch as the valuation made of the railroad property showed that the increase of 0.4 cents a mile was warranted and that there was no opposition it saw no reason to withhold the extra fare. Hearings will be continued, however, to fix definitely a just and reasonable fare.

In this proceeding the decision is based upon the value of the physical property of the company, which the board found to be \$2,524,755. Against this are outstanding securities amounting to \$2,296,650. The decision states that the value of the physical property without any allowance for intangibles of any kind is in excess of the total amount of the securities issued.

For the year 1920 the company showed a loss, after payment of operating expenses and income deductions, amounting to \$66,395 and for the year 1919 the net loss was \$85,313. With the increased fare proposed it is estimated that there will be a net loss of more than \$9,000. The board holds, said Secretary Barber, in a synopsis, that the proposed rates are not unjust or unreasonable and will not produce an excessive return on the physical value of the property. The schedule of rates filed is allowed to become effective on June 1.

More Bus Feeders

Self-Preservation Measure Taken by
Pacific Electric Railway—Six-Cent
Fare with Transfers to Railway

Additional bus line feeder service has been commenced, experimentally and on a small scale, by the Pacific Electric Railway, Los Angeles, Cal., in connection with its rail lines, and in competition with motor lines, as a matter of self-protection. The present plan has in view immediate relief for the Hollywood district of the city of Los Angeles, which is at present without electric railway service.

LOCAL BODY URGED SERVICE

The appeal of the company to establish the service was made to the Los Angeles Board of Public Utilities on May 10 in the form of a request for motor bus line reaching from Sunset Boulevard and Western Avenue to the Los Felix boulevard at Griffith Park, the largest park in the city established in the outlying section, attracting a large volume of travel, but reached only by automobiles at present.

In the company's application, which is formally made by the Pacific Electric Land Company, it is stated that this motor bus service is to be operated in conjunction with the electric railway now serving the Hollywood district. Approximately 2 miles will be covered by the motor bus line. At least two motor buses will be placed on this new route when it is established. The buses will operate every twenty minutes, and during the two rush hours in the morning and evening the buses will have a headway of fifteen minutes, it is declared. During the weekdays the bus line will operate between the hours of 6.30 a.m. and 11.30 p.m.; on Sundays the hours of operation will be between 7 a.m. and 11.30 p.m. It is anticipated that a fare of 6 cents will be charged on these buses, and it is declared by the company in its application that transfers will be given on its electric car line, good for transportation on the motor buses and vice versa. The buses, it is stated, will be the latest model, with pneumatic tires and a passenger capacity ranging from nineteen to twenty-three persons. If the bus line application is granted this will make the second feeder line of the kind operated by the company as it is now operating autos between San Bernardino and Highland, some 9 miles.

THROUGH FARES NOW IN EFFECT

In this connection the company has just announced that it has published and put into effect its through fares and joint ticketing arrangements for the making of connections with the auto stages of the San Bernardino Mountain Stage Line, which operates stages from San Bernardino to a large number of mountain resorts in the San Bernardino Mountains; also, similar arrangements for the company's trains to be met by the auto stages of the Creger Auto Stage Lines at Riverside, operating auto stage lines between Riverside and the mountain resorts in the

San Jacinto Mountains. By this arrangement the running time is reduced 45 minutes as compared with the trip entirely by auto stage.

In discussing this question it is of interest to note that the bill to tax motor freight and passenger lines 2 per cent of their gross receipts, less local taxes, is now before the Governor for his signature. The motor transit companies claim this proposed 2 per cent tax on motor carriers would be "confiscation of property without due process of law."

New Five-Cent Lines Started by Boston "L"

A 5-cent fare for local riders will be instituted on the Medford and Somerville lines running to Sullivan Square Terminal of the Boston (Mass.) Elevated Railway on Saturday, May 28. Plans of the trustees to extend this experimental low-fare service to this district were announced in these columns several weeks ago. Six main lines, and several rush-hour tripper routes will be affected.

It is known that the trustees have under consideration plans for starting this 5-cent fare service in other districts, from time to time, unless the present experiments should prove unsuccessful. It should be understood that the regular fare for a through ride from any district to Boston, as well as regular fares on city lines, is still 10 cents. It was recently stated by General Manager Edward Dana that less than 3 per cent of the total passengers were riding for 5 cents. This change in Medford and Somerville, however, will undoubtedly increase the percentage.

In a statement issued to the public advising of the new system in Medford and Somerville, Mr. Dana said:

This experimental method offers a means of separating through traffic from local traffic and thereby permits a different rate of fare. Its success will depend entirely upon the amount of local revenue produced.

Modifications will undoubtedly be necessary as the results of the experiment are known.

Sufficient new business must be secured so that the new rates of fare will not be a burden upon the present 10-cent car riders of the system.

The success of the plan rests entirely with the car riders of the district, and in view of the fact that the experiment is one along broad lines of a progressive nature, if sufficient new traffic is not received it will be conclusive proof and offset previous theories.

"Ain't It Discouraging"

In a recent issue of *Trolleygrams*, a leaflet issued by the Dallas (Tex.) Railway, has this to say about presenting the exact fare as a means of speeding up traffic:

When the car stops and there are eight or ten people waiting to get on—and you have your 6 cents in your hand—and several of your friends have their exact fare all ready—and it looks like "easy sailing"—and then a feller in front of you pulls a five-spot on the conductor and wants change—and you have your foot on the step—and the rest of the crowd is waiting in the street—Gee! Don't you wish that everybody could remember to have the exact fare ready?

Emergency Plea Disallowed

Ten-Cent Fare Refused to Public Service Railway by New Jersey Board

The application of the Public Service Railway, Newark, N. J., for permission to charge a 10-cent fare on its lines in New Jersey was denied by the Board of Public Utility Commissioners on May 20. At the present time the fare of the company is 7 cents, and it asked permission to increase this to 10 cents.

It is held by the board that no such critical condition exists in the company's affairs as would require the application of the 10-cent rate, or any other emergency rate at this particular time.

There were two proceedings pending before the board, in which the company's rates were involved. One was the application disposed of on May 20, which was predicated upon the existence of an emergency. The other is the action instituted by the board, in which it proposes to fix just and reasonable rates for the company, and in which the valuation of the line must necessarily be one of the bases to be considered.

The board in its decision stated that there have been so many variations in the rates charged by the company within the last few years that it becomes pertinent to inquire whether or not such an emergency exists as to necessitate immediate disposition. Reference is made to the fact that emergency rates were allowed the company at a time when the country was at war and a crisis was imminent.

At that time it was held that additional revenue was necessary, and the boards holds that it now must be satisfied that a similar emergency exists if any new rate is to be approved. In the pending proceeding involving valuation, a finding will result upon the full consideration of all factors, and this proceeding must be terminated not later than July 14.

In its finding the board said:

The board is unwilling to extend the emergency doctrine made necessary, as it was, by the government increasing wages as a war measure, at least until it is shown that an increase in rates is imperatively needed to render safe and adequate service to tide the utility over until a just and reasonable rate can be fixed after all the elements involved in the making of such a rate have been considered.

The board does not consider an allowance for many of these items appropriate in an application of this kind. They do not constitute elements of emergencies and more appropriately deserve consideration in the fixation of just and reasonable rates rather than "emergency" rates. The board, therefore does not approve of the schedule of rates filed by the company.

Nor is there, in the opinion of the board, such an emergency present as would require it to fix any other rate in excess of the existing rate without consideration of all of the elements recognized as being entitled to consideration in a proceeding to fix a just and reasonable rate. The rate proceeding which was begun by the board and is now pending has consumed more than two years. Supplementing the vast amount of testimony as to value which has been taken in this proceeding, there has been filed with the board the valuation fixed by the engineers engaged pursuant to the legislative enactment of 1920.

This proceeding must be terminated by the board not later than July 14. The case will necessarily have to be proceeded with as rapidly as possible and under all conditions a result based upon the investi-

gation with a full consideration of the various factors necessarily requiring consideration for the fixation of a just and reasonable rate would be more just to both the public and the company than one based upon the few factors presented in and necessarily the only ones considered in emergency cases.

A writ of certiorari to review the action of the commission in refusing a 10-cent fare was granted on May 21 by Supreme Court Justice F. J. Swayze in Jersey City. Application for the writ was made by Frank Bergen, general counsel for the Public Service Corporation, of which the railway company is a subsidiary.

Edward Herman, who is the counsel for the commission, opposed the granting of the writ. He said that the investigation made by the commission showed that the company could maintain adequate service at the present rate of fare. The writ is returnable on May 28.

Thomas N. McCarter, president of the company, issued a statement to the public in which he said in part:

A property that has been starved under forms of legal procedure for three years past can, perhaps, continue to subsist on limited rations for seven weeks more, but to the extent that the premises of the board and the legal principles adopted by the board are in conflict with the law, they should be corrected by the proper tribunal to the end that justice may be done.

In substance, the board holds that, by estimating a gross increase in the company's business for the current year far in excess of that justified by the portion of the year which has expired, or by any facts indicating any such increase, and by a further paring down of the estimated operating expenses to the very bone, which, of course, must reflect itself in less efficient service, the company will have enough revenue to pay its operating expenses.

And in addition to its operating expenses, the board holds that it will have enough for its fixed charges, and \$510,000 for replacement and renewals. Not a cent is provided for return upon the stockholders' investment of \$50,000,000.

Under these conditions, the company is without credit and unable to obtain capital. If the basis on which this report is made can be sustained, and is to be a criterion of operations directed by the board, there is no hope for the Public Service Railway, and, in my opinion, none for the public regulation of utilities.

Toledo Bus Men Attempt to Trick City

Bus owners of Toledo, Ohio, have failed in their attempt to bring to a referendum vote the regulatory measure passed recently by Council at the solicitation of Street Railway Commissioner W. E. Cann. They will have until June 1 to secure their licenses and indemnity bonds. This was determined at a conference of city officials Saturday.

The bus men had organized and submitted a petition to the electorate, but when the 17,498 names were checked over by City Clerk Albert Payne it was found that not more than 4,575 were bona fide signatures. This lacked 2,084 of the legal number to bring a vote on the ordinance.

The ordinance is to be defied by the bus drivers, according to one of their attorneys. However, the city police department is ready to enforce the ordinance and the buses will be fined \$100 to \$500 for operating after June 1 without a license.

Jitney Fight in Birmingham

The fight over jitney regulation in Birmingham, Ala., will probably begin when H. P. Burruss introduces an ordinance drawn by the city attorney providing for a liability insurance amounting to \$5,000. J. Weatherly, representing the jitney operators, will defend the present system.

The matter recently came to a head after an inspection of all the public utilities in Birmingham by the State Public Service Commission. The commission found that unrestricted jitney operation was taking too much revenue from the Birmingham Railway, Light & Power Company, the local company in Birmingham, and that another increase in fares was imminent unless something was done to relieve the financial distress of the company.

Associate Cooper's report follows in part.

Relief from the disturbing conditions in the company's finances must come through readjustments which will give the company reasonable revenue without decreasing the service. It seems to me the solution of the problem must be in the regulation of those agencies in Birmingham which are now taking the short hauls from the company, the operators of automobiles for hire or the so-called jitneys. The commission found that operators of jitneys were obtaining the cream of the business on the short hauls, leaving the long hauls to the street railway. For instance, not many months ago the paving of Tuscaloosa Avenue in West End was completed. Since that time the revenue from the West End line of the street railway has shown a decrease of about 30 per cent. This decrease has resulted from the operation of jitneys on Tuscaloosa Avenue to the end of the pavement.

Dallas Denied Seven-Cent Fare

One of the last acts of the retiring city administration in Dallas, Tex., was to refuse to grant the application of the Dallas Railway for authority to increase its fares from 6 cents to 7 cents. The application had been pending for several months during which time the City Commission had conducted exhaustive investigation into the financial status of the traction company.

The commitments and promises made by the Strickland-Hobson interests in securing the present franchise in 1917 were also investigated and the traction company was shown to have failed to carry out all these promises. Lack of funds was pleaded as an excuse and this in turn was used to show the pressing need for additional revenue. The traction company has filed with the new city administration a motion for rehearing.

The action for a rehearing is taken under a provision of the recently enacted charter amendment which provides that any public utility must file motion for rehearing with the city commission before it is permitted to take an appeal to the Federal court. This action is believed to be preliminary to an appeal to the Federal court on the plea that the present fares in Dallas are confiscatory in that they do not permit an adequate return on invested capital. Traction company officials some time ago intimated that if the city refused to grant the increased fare the case would be taken directly to the Fed-

eral court in an effort to get needed relief.

The board of city commissioners in refusing the application for a 7-cent fare for the railway went on record as recommending to the new board of city commissioners that if it is shown that the traction company needs more revenue after the permission for the 6-cent fare expires on June 25 an extension of twelve months be made on the 6-cent fare agreement. When the railway company was given permission to inaugurate a 6-cent fare such permission was limited to one year, but the company was given authority to ask an extension of twelve months after the expiration of the year.

Jitneys a Menace in Indianapolis

H. O. Garman, chief engineer of the Public Service Commission of Indiana, in an address on May 20 declared that the jitneys are taking away from the Indianapolis Street Railway between \$600 and \$700 every day. He firmly believes that the jitney buses caused the decline in the revenue of the railway which necessitated an increase in fare. Mr. Garman brought out in his address the result of a recent informal conference between members of the commission and officials of the railway.

Evidence was submitted indicating that present rates are inadequate and that the company will face a deficit at the end of the year under present operating conditions.

Mr. Garman said it is his belief that the jitney should be eliminated. Perhaps the city officials who are opposing additional fare increases could refuse to permit the jitneys to operate over the streets.

Dr. Henry Jameson, chairman of the board of directors of the railway, when informed of Mr. Garman's statement, said:

If the city is going to continue to have street car service it's got to do something on this jitney proposition, and do it pretty quick. I would not go so far as to say a return to 5-cent fares would follow immediately an order prohibiting operation of jitney buses. I do, however, believe such a decrease would result eventually. The company has been coming out on the red side of the ledger for the greater part of the last six months. We never have been able to show a satisfactory balance. Until we can show a surplus of between \$200,000 and 300,000 we will be unable to obtain the extended credit necessary to provide improvements.

The present fare of 6 cents, with a 1-cent transfer charge and provision for the sale of twenty tickets for \$1, has been continued by the commission until June 1.

Third Arbitrator Still Unselected

Charles Currie and Judge S. W. Crawford, representatives of the Northern Ohio Traction & Light Company, Akron, Ohio, and the unions respectively, have been unable to agree upon the selection of a third arbiter to settle the wage dispute now pending. It is likely that the third arbiter will have to be appointed.

Commission Bill Being Jammed Through

The bill before the Illinois Legislature which would abolish the present utilities commission and create the Illinois Commerce Commission with greatly reduced authority was passed by the house on May 25 by a vote of 100 to 23. It was jammed through as an administration measure, having been heralded as carrying out Governor Small's pre-election pledge. The bill will come before the senate during the week commencing May 30.

Transportation News Notes

Seven Cents Asked in Duluth.—The Duluth (Minn.) Street Railway has filed a request for an emergency fare of 7 cents or four rides for 25 cents with the State Railroad & Warehouse Commission. The request was filed in informal form only. Later papers setting forth in detail the financial needs of the company will be filed with the commission.

Railway Reduces Rate.—L. E. Myers, president of the Ironwood & Bessemer Railway & Light Company, Ironwood, Mich., announced that the fare would be reduced to 6 cents in Ironwood, effective May 9. The fare between Ironwood and Bessemer has been reduced 1 cent for each zone, making the new rate 18 cents instead of 21 cents. The reduction was made voluntarily by the company.

Asks to Run Bus Line.—The Springfield (Mo.) City Council has been petitioned by the Springfield Traction Company for permission to discontinue service on Center Street and to substitute bus service. The company states that modern auto buses would be procured and that a 5-cent fare would be charged with an additional 2 cents for a transfer to any other company line. The line is known as one of the short lines of the railway, and has been operated at a loss for some time. No action has been taken by the City Council.

Jitney Hearing Continued.—A hearing before the Board of Public Utility Commissioners of New Jersey took place on May 9 at Camden relative to licenses issued to jitney operators after March 15, which was the limit placed by the law when buses would be allowed to run on streets where there were trolley tracks, without the permission of the commission. The hearing will be continued, but tentative rulings were made relating to the operation of the Swedesboro and Blackwood buses. It is understood these buses will be allowed to operate provided they do not pick up and discharge passengers for rides wholly within the city limits.

Safety Islands for Columbus.—The Columbus Railway, Power & Light Company, Columbus, Ohio, may have "safety islands" for the benefit of pedestrians and car riders at High Street stops. The Columbus Automobile Club has asked Council for permission to construct the "islands." It is planned, if Council agrees, to construct "islands" at the two stops at Broad and High Streets, in the city's center, to test them out.

First Safety Contest Successful.—The first safety contest on the lines of the Southern Public Utilities Company in Charlotte, Winston-Salem and Greenville ended on Feb. 28 with the city of Charlotte making the best showing. A summary of the accidents shows that during the four months of the contest there were 97 accidents at Charlotte, 125 at Winston-Salem and 184 at Greenville. In all \$1,635 prize money was awarded. The contest was so successful that the president of the company authorized the expenditure of \$1,500 in a second contest which was scheduled to start April 1.

Needs Increased Rates.—The Ontario Government, owner of the Nipissing Central Railway, North Cobalt, Ont., recently applied to the Dominion Board of Railway Commissioners for an order authorizing a 25 per cent increase in passenger rates on this line. In the application it was stated that last year the net deficit on passenger traffic alone came to \$21,024, while for the five months ended March 31 last the deficit reached \$18,000. Several towns on the route opposed the increase. Assistant Chief Commissioner McLean suggested that the question of reducing service should precede the raising of fares.

Eight-Cent Fare Extended.—The Missouri Public Service Commission recently authorized the extension of the 8-cent fare in Kansas City for six months from April 8. In extending the present Kansas City carfare for another six months, the State Public Service Commission has issued a statement that the last four months indicate the company now has an annual net income slightly less than \$1,000,000, while the company's indebtedness carries an interest charge of about \$2,000,000, now in default.

Seeks Ten-Cent Rate.—The Southwest Missouri Railroad, operating in Jasper County, Missouri, and into the mining districts of Kansas and Oklahoma, has filed a petition with the Missouri Public Service Commission asking for an increase in passenger rates between Carthage and Joplin to 10 cents. The fare has hitherto been 1½ cents a mile. Much of the prosperity of the mining regions has departed, the petition recites, as the sharp drop in the price of lead has practically depopulated many of the towns. The company lost \$8,212 in March, 1921, as the result of its operations between Carthage and Joplin.

Fare Raised to Seven Cents.—The State Public Utilities Commission has authorized the Nashville Railway &

Light Company, Nashville, Tenn., to charge a straight 7-cent fare at Nashville in lieu of the four tickets for a quarter heretofore in vogue. Tickets will be issued five for 35 cents. The new rate was ordered for May 8. The utilities commission will retain jurisdiction of the case for such other and further orders as the conditions may warrant from time to time. Rates stand to be adjusted so as to give a return of not less than 6 per cent nor more than 7½ per cent on valuation as made several months ago.

Fare Increase Protested.—Through the instigation of a number of patrons of the Valley Railways, serving the Cumberland Valley in Pennsylvania from Harrisburg, an appeal will be made on the recent decision of the Public Service Commission allowing the railway to increase its fare from 7 to 8 cents. In all probability the Superior Court of the State will be asked to overrule the Public Service Commission on the ground that the increase is unjustified on account of decreasing cost of materials. This is the same ground cited by the commission in refusing the increase appeal of the Pennsylvania-Ohio Electric Company, operating in the city of New Castle, Pa.

Eight Cents in Helena.—The Montana Railroad & Public Service Commission has given permission to the Helena Light & Railway Company, Helena, Mont., to charge an 8-cent fare on its city lines. The East Helena fare will be 15 cents. The higher rate in the city will have a sixty-day trial beginning May 20. Provision has also been made for commutation tickets—forty for \$2, to be used within 15 days. These will be issued in place of the present tickets, which are forty for \$2.50, or 6¼ cents each. The company recently petitioned for a 10-cent fare, claiming that the award of the commission last July granting a 7-cent fare with a 6¼-cent ticket rate did not net a reasonable return.

Wants Increased Rates.—The Lynchburg Traction & Light Company, Lynchburg, Va., recently petitioned the State Corporation Commission for an increase in railway rates from 5 cents to 6 cents on both city and suburban lines. The company had asked for a 6-cent fare over all its lines and according to the franchise between the city and the traction company, the Council has permission to increase the rates. However, the City Council declined to grant the increase and accordingly the company petitioned for an 8-cent fare outside the city limits of Lynchburg. At a recent hearing before the commissioners former Senator Aubrey E. Strode appeared for the County of Campbell protesting against the proposed increase. The commission adjourned the case until June 1, when further opposition will be heard. A digest of the valuation figures of the Lynchburg property was published in the ELECTRIC RAILWAY JOURNAL for May 14.

Petitions Council for Increased Rates.—The Buffalo & Lackawanna Traction Company, Buffalo, N. Y., has petitioned the City Council of Buffalo for a 10-cent fare and abandonment of the transfer exchange with the International Railway. The company leases to the Buffalo & Lake Erie Traction Company the right-of-way along the Hamburg turnpike to the city line at Lackawanna. Under the franchise provision was made for a 5-cent fare only with an interchange of transfers between Buffalo & Lake Erie and the International Railway. There has been no local service for more than a year, which fact will be used by the city as an argument against the traction company. Under a decision of the Court of Appeals the old commission lacked authority to raise the fares. The new commission can suspend franchise obligations. An appropriation of \$5,000 was authorized to oppose the petition for increased rates.

New Publications

Maintenance of Way Cyclopedia

Compiled and edited by E. T. Howson, editor *Railway Maintenance Engineer*; E. R. Lewis, formerly chief engineer Duluth, South Shore & Atlantic Railroad, and K. E. Kellenberger, editor *Railway Signal Engineer*, assisted by Homer Hughes, formerly assistant field engineer Interstate Commerce Commission, in co-operation with a committee of the American Railway Engineering Association. Published by Simmons-Boardman Publishing Company, New York, N. Y.

As stated on its title page, this is a reference book covering definitions, descriptions, illustrations and methods of use of the materials, equipment and devices employed in the maintenance of the tracks, bridges, buildings, water stations, signals and other fixed properties of railways. The volume is composed of two general divisions, the illustrated text and the catalog section. More than 2,500 illustrations are employed, and the illustrated text is separated into sections corresponding to the several subdivisions of maintenance-of-way work, including tracks, bridges, buildings, water service, signals and wood preservation. There is also a general section including the devices commonly used in railway work. A directory is appended giving names of manufacturers of the products included in the cyclopedia. While the articles in the several sections are arranged alphabetically by titles, there is also a complete general subject index which will facilitate the use of the volume. In the space available here it is impracticable to review the contents of this valuable compilation, which will be useful in supplying definitions and reference information to electric railway engineers who are responsible for tracks, buildings, signals, etc.

Personal Mention

Mr. Sprague Honored Again

"Father of Electric Traction" Awarded Franklin Medal in Recognition of His Scientific Attainments

Frank Julian Sprague, who was awarded the Franklin Medal, with unanimous election to honorary membership, by the Franklin Institute on May 19, in addition to his pioneer work with the electric motor has had a hand in a large part of the electric railway development which has occurred in this country. A summary of his connection with several significant enterprises in this field, which has earned him the sobriquet of the "father of electric traction," was included in the address delivered on the occasion of the pres-



FRANK J. SPRAGUE

entation of the medal and abstracted elsewhere in this issue.

Mr. Sprague was graduated from the United States Naval Academy in 1878, at the age of twenty-one. He was appointed to the Academy from Massachusetts, to which state he had moved in early youth. Five years after graduation he resigned from the Navy to join the technical staff of Thomas A. Edison, with whom his duties related principally to lighting matters, to which he made essential contributions. His main interest was even at this early date in the application of electricity to power purposes, both industrial and for traction, and within a year he had organized a company to carry on this work. His indomitable energy, as potent today as it was thirty-seven years ago, enabled him to overcome heart-breaking obstacles. His work developed logically along the lines, first of the application of new types of the electric motor to general industry, and then successively to the trolley, rapid transit and steam railway electrification. Meanwhile he developed an electrical system of elevator drive and control, the problems of which were anal-

ogous to those of traction. At present he is concentrating attention upon a system of speed control and automatic brake application on steam trains, to which he has given the past eight years.

During his vigorous career Mr. Sprague has been honored in many fields. He was awarded a gold medal at the Paris Exposition in 1889 and the grand prize of the Louisiana Purchase Exposition in 1904; and also in 1910, from the American Institute of Electrical Engineers, of which he is a past-president; the Edison medal "for meritorious achievement in electrical science, engineering and art, as exemplified in his contribution thereto." He is also past-president of the American Institute of Consulting Engineers, the N. Y. Electrical Society and the Inventors' Guild, was a member of the Naval Consulting Board during the war and has acted as consultant on some of the most important electrification projects.

The Franklin medal, which is one of the highest world awards, is the second medal awarded to Mr. Sprague by the Franklin Institute, the former being the Elliott Cresson medal, which he received in 1904 for his development of the multiple-unit system of railway control. The Cresson medal recognizes "some discovery in the arts and sciences, or the invention or improvement of some useful machine, or some new process or combination of materials in manufactures, or ingenuity, skill or perfection in workmanship."

The Franklin Medal is awarded annually from a fund founded by Samuel Insull "to those workers in physical science or technology, without regard to country, whose efforts . . . have done most to advance a knowledge of physical science or its applications," and was given to Mr. Sprague "in recognition of his many and fundamentally important inventions and achievements in the field of electrical engineering, notably his contributions to the development of the electric motor and its application to industrial purposes, and in the art of electric traction, signally important in forming the basis of world-wide industries and promoting human welfare."

The meeting of the Institute on May 19 was a notable affair, attended by General John J. Pershing, who was made an honorary member of the organization; Ambassador Jules Jusserand of France, who accepted the same honor and the Franklin Medal on behalf of the distinguished French physicist, Professor Charles Fabry of the University of Paris, and many other celebrities. A paper by Professor Fabry was read by Professor J. S. Ames of Johns Hopkins University and Mr. Sprague gave an abstract of an extended paper on the history and prospects of electric traction.

Opens Consulting Office

S. H. Grauten, Who Redesigned Kansas City Railways Distribution Systems, Has Resigned

S. H. Grauten, electrical engineer and head of the research and consulting department of the Kansas City (Mo.) Railway, left the service of that company on April 15. Mr. Grauten has opened a consulting electrical engineering office in Kansas City. He has signed contracts to act as electrical engineer for the Kansas City Western, the Kansas City-Kaw Valley & Western, and the Pittsburg and Joplin Railways, and also for several other roads.

While with the Kansas City Railways Mr. Grauten had charge of the redesigning and construction of the entire distribution system, which included the rearrangement of substations and the installation of new ones. Some of these were automatics and were among the first to be installed in the United States. His duties included preparing the estimates, specifications, plans and con-



S. H. GRAUTEN

tracts, and supervising the construction. In 1918 he was also responsible for the operation of the distribution system, involving power dispatching, substations and the transmission system. At the same time he was also engaged in an electrolysis investigation in connection with engineers of the United Gas Improvement Company and the research committee of the American Committee on Electrolysis.

An article appeared in the JOURNAL of Dec. 11 under Mr. Grauten's name in which he described the most recently completed substation, where there were incorporated several unusual features of building design and equipment.

Since his graduation from the University of Illinois in 1907 Mr. Grauten's experience has been wide. His first year out of school was spent at the Massachusetts Institute of Technology at Boston as an instructor. Following this he entered the electrical department of the New York Central in connection with the electrification of the Grand Central Terminal, where he acted as engineering assistant to the superintendent of power. After four years of this he went to the Panama Canal.

There he had charge of putting into service and making the tests of the entire electrical and mechanical equipment at the Gatun Locks hydro-electric plant and spillway. Mr. Grauten was in charge of the operation of the Gatun Locks from the passage of the first boat on Sept. 18, 1913, until the appointment of an army captain to that position in May, 1914.

MR. GRAUTEN VERY POPULAR

From September, 1914, to May, 1916, Mr. Grauten was with the Public Service Company of Northern Illinois, under J. L. Hecht, assistant to the president. He was employed on appraisal work and later on substation design, being in charge of this work during 1915-16.

Mr. Grauten was very popular with the organization at Kansas City and his leaving is a matter of regret to every one connected with the company. Although a highly technical engineer both by education and training, Mr. Grauten had the happy faculty of combining technical engineering with practical operation in a manner to secure the best results.

H. E. Blain, C. B. E., assistant manager of the London Electric Railway, sailed from England on May 25 for New York on the Olympic. He expects to remain in this country about six weeks, and will study recent developments in American traction systems.

Reinier Beenwkes, chief electrical engineer of the Chicago, Milwaukee & St. Paul Railroad, who has recently been given a several months leave of absence, sailed from New York City on May 11 for Panama and South American ports.

Walter Jackson, consulting engineer, sailed May 24 for Europe on the *Aquitania* for a tour of the United Kingdom and the principal continental cities to make further first-hand studies of the latest developments in fares, transportation salesmanship, motor buses and trackless trolleys. He does not expect to return to the United States for several months.

Edgar Blessing, Danville, Ind., an attorney, has been appointed by Governor Warren T. McCray to membership on the Indiana Public Service Commission. He succeeds E. I. Lewis, who resigned to become a member of the Interstate Commerce Commission. Mr. Blessing, whose term will expire May 1, 1923, will assume his duties with the commission June 1.

L. H. Appel has been appointed assistant electrical superintendent of the Pacific Electric Railway. Mr. Appel first affiliated himself with the Pacific Electric Railway in June, 1912, under S. H. Anderson, electrical superintendent. He served in the capacity of operator, electrical inspector, estimator and power clerk. In December, 1915, he was advanced to the position of chief clerk to the electrical superintendent, in which capacity he served until April 1, 1921, when he was promoted to his present position.

Obituary

Col. J. F. Strickland

All Texas Mourns Death of Eminent Utility Promoter, Financier and Operator

Col. J. F. Strickland, president of the Dallas (Tex.) Railway, the Texas Electric Railway, and several other utility companies, recognized as one of the leading traction men of the entire country, died suddenly at his home in Dallas on May 21. Death was due to an attack of illness affecting the heart.

Colonel Strickland was 60 years old, and at the time of his death could look back from a position of power in the traction world over a path of remarkable successes that come to few men. Born in Alabama, he early in life decided to come to Texas, and borrowed



COL. J. F. STRICKLAND

money to make the trip. His first work was on a farm near Waxahachie, where he saved his money and soon had sufficient capital to enter the cotton ginning business at Avalon, a small village near Waxahachie. Later he engaged in the wholesale grocery business under the firm name of J. F. Strickland & Company. In 1897 Col. Strickland entered the utility field as manager of the Waxahachie Light & Power Company, in which position he continued until 1902 when he became associated with Judge M. B. Templeton, Dallas, now head of the legal department of the Strickland interests, and Ocie Goodwin, also an official of the Strickland companies.

These three men conceived and carried through the idea of a central electric generating plant to supply current for a number of northern Texas cities out of which eventually grew the present great company known as the Texas Power & Light Company.

At this time the territory north of Dallas appealed to the three men as a field of large possibilities for interurban lines, and they began to lay plans

for building interurbans which today are consolidated into the Texas Electric Railway, one of the longest interurban lines in the world. In 1904 the Texas Securities Company was organized to own the stocks and to finance the various projects which these men were planning.

In 1906 the preliminary work of constructing the interurban line from Dallas to Denison was begun and the Texas Traction Company was organized with Col. Strickland as president. It is generally conceded that it was due largely to the tenacity of purpose and broad vision of Col. Strickland that the money was procured to complete the line, which was put into operation on July 1, 1908.

The next large venture of Col. Strickland was the organization of the Texas Light & Power Company, under which organization electric current for lighting and power is supplied to more than 100 cities and towns of northern Texas and power for the operation of the interurban lines of the Strickland interests is generated.

Organization of the Southern Traction Company was the next big venture, and in 1912 the interurban lines from Dallas to Waco and Corsicana were completed and put in operation by this company. The Texas Traction Company and the Southern Traction Company were later consolidated into the Texas Electric Railway and the interurban line from Denison to Waco operated as a unit with through service from one of the lines to the other.

In 1916 Col. Strickland, at the request of the city officials of Dallas, undertook the work of developing franchises granted by the city of Dallas to the electric light company of the city. Service had been poor and unsatisfactory and the city officials turned to a man who they believed would be able to bring order out of chaos and give the city adequate service. The Dallas Power & Light Company, one of the most successful lighting and power companies of the entire state, attests the genius and ability of the man the city officials had chosen.

About this time the four street railways operating in Dallas were consolidated under the direction of C. W. Hobson of the General Electric Company. Just before the consolidation was effected Mr. Hobson discovered that he would be unable to take control of the lines as he had planned, and Col. Strickland was persuaded to take over the lines. The Dallas Railway was organized with Col. Strickland as president, under the so-called service-at-cost franchise granted in October, 1917.

Under the commitments made at the time the traction franchise was granted in 1917, Mr. Strickland was compelled to build two interurban lines each at least 30 miles long into the city of Dallas, and he recently organized a company to build an interurban line from Dallas to Terrell. Work on this line is now under way.

At the time of his death Col. Strickland was president of seven utility and allied companies in Dallas.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Lower Prices No Stimulant to Line Material Demand

Last Decrease of 6 to 9 per Cent the First of This Month Makes Third This Year

Price reductions on overhead copper line material have failed to stimulate buying to any degree as yet. The last reduction was made by producers around the first of this month, the decrease taking effect on April 29 in one instance and on May 5 in a couple of others. This decrease, which is the third since the first of the year, amounted to from 6 to 9 per cent and covered both bronze and malleable iron material. The discount allowed by one producer on a certain item in this field shows the trend of prices very well. The peak appears to have been reached about last July when in this one representative instance the discount went from 20 to 10 per cent. It remained there until January, 1921, when it went to 15 per cent, in February it increased to 20 and with this last price decrease goes to 25 per cent.

Buying continues to be for maintenance only, though a slight improvement recently in that respect is noted in one or two quarters. The general market remains quiet, however, with railways not endeavoring to stock ahead. Some consumers, it is stated, are still looking for lower prices, but on the other hand, a representative producer states that this last price decrease was made more in an attempt to induce buying rather than because of lower costs.

Stocks of standard finished products and semi-finished material in this field are good, with prompt deliveries prevailing. Some manufacturers are continuing production on a basis whereby demand is expected to increase materially later in the year.

Electrolytic copper is stronger again with producers quoting 13.37½ cents to 13.50 cents for spot, May and June delivery.

Lower Prices on Brass

Buying, Although Light, Is Better Than It Was in April

Reductions in brass prices of the order of 1 cent per pound were announced last week in manufacturing circles. Makers of schedule material expressed to the ELECTRIC RAILWAY JOURNAL their satisfaction in this reduction upon receipt of the new price lists. At present business in the brass field as related to electrical production is much below normal, but a leading producer of socket-shell material said last week that the May business had been considerably better than that of

April. The chief demand just now is for copper products. Competition for business is very acute. Reductions in wages and salaries of the order of 10 per cent have lately been made in the brass industries, and some of the mills are running on half to two-thirds time. A 10,000-lb. order looks large today.

There has been no change in the price of copper products since April 18, according to a representative manu-

facturing establishment. The new base prices for brass in quantity lots as issued by a leading house are as follows: Sheet metal, high brass, 16½ cents per pound; low brass, 17½ cents. Wire, high brass, 14½ cents; low brass, 18½ cents. Rods, high brass, 14½ cents; low brass, 18½ cents. Brazed tubes, brass, 27½ cents. Seamless tubes, high brass, 20 cents; low brass, 21½ cents; copper, 22 cents.

Rail Mill Operation at Higher Capacity Than Other Steel Business

Sizable Orders for Both T and Girder Rails Placed Early This Year Keep Plants Fairly Busy—Present Buying Is Light Though Improvement Is Expected This Fall

Steam railroads have ordered steel rails this spring comparatively better than electric lines, according to reports received from producers. The tendency of electric traction companies has been to hold off buying and though there is undoubtedly a tremendous potential need for girder rails throughout the country, it has not resulted in heavy buying. The same is more or less true in the steam road field, only with this difference—steam railroads have ordered only for maintenance too, but their absolute repair needs have so accumulated that the tonnage placed has been considerable.

The standard T-rail business of mills at the present time is in much better shape than other classes of steel business. Around the first of the year sizable orders were placed, the buying coming early and largely at one time. The same is true of girder rail orders; a fair tonnage was placed early this year, and these orders are now keeping mills fairly busy. Unfortunately, however, at the present time there is hardly a thing in sight in the way of new business and when present orders on the books are filled it looks as if rail departments will be in the same condition as the other classes of the steel business.

Of course production even now is by no means at capacity and it is very possible that operation can be strung out until business improves. In fact, rail producers in several instances are counting upon this fall to develop good buying. By that time the all-important wage decision, which it seems will be in favor of the railroads, will have had time to make itself felt.

Foreign buying is flat for there is considerable competition offered by rail mills abroad whose output is greatly favored by prevailing exchange rates, and customers seem to be waiting for lower prices to develop here. In this

connection a South American country has recently placed an order for more than 4,000 tons of steel rails with a German company at a price which American producers could not meet and at the same time the seller extended longer credit terms than Americans are accustomed to do.

The market for open-hearth rails in this country remains unchanged at a price of \$47 per ton. Girder rail prices are not uniform at present but on a recent order for 100 tons of a 122-lb. grooved girder rail a price of about \$65 per ton was made, while for 200 tons of a 140-lb. guard rail section the price was about \$93.25 per ton. Labor costs are now considerably lower in this field, for with the wage cut of 15 per cent inaugurated by the U. S. Steel Corporation, all producers have reduced wages from 15 to 20 per cent and some of the independents have recently announced a second reduction. Shipments at the present time are prompt and in general average from 4 to 6 weeks.

Some Further Data on Raw Material Costs

Increases Over Pre-War Prices Appear to Be Still Above Those of Finished Products

Prices of raw material used by manufacturers in the electric railway field have of course receded within the past few months and discussion is frequently heard as to whether reductions in the cost of materials have not outstripped the decreases that have been passed on in the finished products. In this connection it is interesting to get a line on where material costs stand at the present time compared with pre-war prices.

The table which is presented here gives the cost of certain materials purchased as late as May, 1921, compared

with the middle of 1915, which materials go into the makeup of electric railway products.

	Increase, Per Cent
Pig Iron	180
Steel plates	101
Copper	12
Steel castings	180
Coke	150
Mica	83
Asbestos insulation materials.....	395
Other insulation materials.....	156
Magnetic sheet steel.....	221

Turning to the status of present prices of several finished products compared with pre-war prices, an increase of 120 per cent is shown on car equipments; electric locomotives, 120 per cent; rotary converters, 117 per cent; switchboards, etc., 120 to 146 per cent, according to the labor content and materials used.

Reduction of prices, according to the same source of information as the above figures, will probably be gradual, depending upon decreases in labor cost throughout the country, declines in raw material cost and increased production. As long as production is low, opportunities for lowering prices, it is stated, are very limited. The problem confronting the average buyer is to determine the value and earning power of new equipment during the next six to ten months and compare this with a possible price reduction of 8 to 10 per cent that might be gained by holding off from buying for that length of time.

Interest Being Displayed in Steel Tower Market

Although Activity Is Not Pronounced, Utilities Are Keeping in Close Touch with Transmission Market

A survey of the foreign and domestic market for steel transmission towers reveals fairly uniform conditions among producers. Present activity at home and abroad is very light, there being little or no demand for this class of material as yet this year. Furthermore, there does not seem to be much prospect of greater buying developing later in the year, for customers are still holding off for lower prices and difficulty in financing new transmission projects continues to retard the market.

In view of the position of this market as a barometer in the electrical industry, however, it is gratifying to note that producers are generally quite optimistic over the future. At the present time several companies report that they are receiving a large number of inquiries both in the United States and from foreign countries. Actual orders, as stated heretofore, are not being placed, but at the same time the pulse of the market is being closely felt and interest on the part of central-station companies and electric railways is considerable. From all accounts it seems that there is a large potential demand being held in abeyance.

The average base price on galvanized material used in fabricating steel towers is now said to be about 7 cents. There does not seem to be much chance of further price decreases being made,

it is stated, unless steel declines further. The extent of price reduction made by different producers varies somewhat, but in a representative instance prices have receded approximately 30 per cent from the peak reached about one year ago. This figure is based upon the cost of one particular job which was figured last spring and finally held over until this year.

Deliveries can be made promptly, for though the finished product is not stocked, steel mills are keen for business and fill orders in quick time. Some producers are also carrying good stocks of material ready for fabrication.

Railway Supplies for Ecuador

The National Tramway Company in Quito, Ecuador, is in the market for tramway materials, railway tools and equipment and hydro-electric plant supplies, according to the Guaranty Trust Company, New York.

Electrification of Railways in South Africa

Tenders will be received by the High Commissioner for the Union of South Africa, Trafalgar Square, London, Eng., or at the office of the general manager, Johannesburg, South Africa, until July 5 for equipment, switchgear and accessories, etc., in connection with the electrification of the Cape Town-Simonstown and the Durban-Pietermaritzburg railway lines. Specifications, etc., at the above offices. Further information on application to Merz & McLellan, consulting engineers, 32 Victoria Street, S. W., 1, London, Eng.

Bids for the Electrification of Santiago-Valparaiso Railway

Bids will be taken by Railway Council until June 30, 1921, for the electrification of the first zone of the railway running from Santiago to Valparaiso. The cost, including electric locomotives, is estimated at 40,000,000 pesos.

Rolling Stock

The Tiffin, Fostoria & Eastern Electric Railway Company, Tiffin, Ohio, has just placed an order with the Differential Steel Car Company for one new dump car.

The Southern Pacific Railway, according to J. A. Ormandy, assistant general passenger agent, will put 12 new cars in operation on the Portland (Ore.)-Corvallis line about July 15. The new cars will cost \$37,000 each, about double what the ones now in operation cost the Southern Pacific.

Canadian National Railways, Toronto, Canada, is testing an electric storage battery car on its tracks between Trenton and Belleville. The car is operated by Edison batteries which it is said will drive it 140 miles on one charge. Maximum speed on level track is given as 40 m.p.h.

The Municipal Railway System, San Francisco, Cal., mentioned in the May 7 issue as completing arrangements for purchasing about 30 new cars, has issued the following information regarding these:

Number of cars ordered	20-30
Type.....	Center entrance; center exit
Seating capacity	32
Weight	26,200 lb.
Length over all	29 ft. 10 in.
Truck wheelbase	12 ft. 0 in.
Width over all	8 ft. 8 1/2 in.
Height, rail to trolley base.....	10 ft. 2 1/4 in.
Body	Semi-steel
Interior trim	Birch
Roof	Arch
Air brakes	Westinghouse
Axles.....	A. E. R. E. A. Standard E-4
Bumpers	Cast steel
Car signal system	Consolidated
Car trimmings	Bronze
Control	K 36 J R
Curtain fixtures	National Lock Washer Company
Curtain material	2-ply Fabrikoid
Designation signs	Hunter
Fare boxes	Johnson
Fenders or wheelguards	Eclipse
Gears and pinions	Helical
Hand brakes	Peacock Staffless
Headlights	Golden Glow
Journal boxes	Brill
Lighting arresters	None
Motors.....	2 Westinghouse 532A Inside Hung
Registers	None
Sanders	Alr
Seats	Hale and Kilburn
Seating material.....	Rattan and 3-ply Veneer
Step treads	Mason Safety
Trolley catchers or retrievers.....	Ohio Brass
Trolley base	Ohio Brass
Trolley wheels	Kalamazoo
Trucks	Brill Radiax E-1
Ventilators	Garland
Wheels	26 in. Steel

Franchises

Walla Walla Valley Railway, Walla Walla, Wash.—The Walla Walla Valley Railway, through C. S. Walters, general manager, has made formal application for a franchise from the county commissioners for operation of a trolley line on East Alder Street and Pacific Avenue, from the city line to the natorium. The franchise is sought from the county because the extension is beyond the city limits.

Tacoma Railway & Power Company, Tacoma, Wash. — Arrangements for street railway service into the North Stevens Street, or the College of Puget Sound district, are being completed, and the City Council has notified the state department of public works that the Council will grant the Tacoma Railway & Power Company a franchise to operate a car line on the proposed route of the Sixth Avenue extension, if the department grants the request of the citizens that the company be directed to give them service. The route to be followed has been agreed upon by the various interests involved.

Recent Incorporations

Abilene (Tex.) Traction Company.—The Abilene Traction Company has been chartered with a capital stock of \$100,000. It will take over the property of the old traction company which failed and which has not been operated for two years or more. The incorporators are J. N. Burjacs, Price Campbell and G. W. Fry.

Track and Roadway

Miami Beach Electric Company, Miami, Fla.—Permits have been secured from the county commissioners for four turnouts on the Miami-Miami Beach electric line, and J. H. McDuffee, treasurer of the Miami Beach Electric Company, announces rolling stock has been ordered along with material for the sidings, preparatory to making the service between Miami and the beach a ten-minute schedule instead of twenty minutes as at present.

Indianapolis (Ind.) Street Railway.—The placing of new special work in car tracks in Indianapolis at Illinois and Thirty-fourth Street, which will make possible the routing of Mapleton cars over Illinois Street, instead of Central Avenue, and also the operation of a crosstown line in Thirty-fourth Street, will start June 15 and be rushed to completion, officers of the Indianapolis Street Railway Company told the board of public works on May 12. The company reported that considerable progress has been made in the rebuilding of the tracks in West Washington Street, from Belmont to Harris Avenue. As soon as this work is done the company will start the rebuilding of the tracks in Delaware Street from Massachusetts Avenue to Washington Street.

Detroit, Mich.—The Department of Street Railways, City of Detroit, expects to build 82 miles of single track this summer, with International steel twin ties and 93-lb. and 100-lb. T rail with concrete foundation. The overhead will call for tubular steel poles in the central district, cedar poles in the outlying districts, feeder cable, 2/0 trolley wire, hangers, gears, span wire, strain insulators, various pole line hardware, etc.

Detroit (Mich.) United Railway.—The Detroit United Railway has received the approbation of the Flint Common Council in the matter of temporary construction for the line on Bray Avenue from Saginaw Street to Flint Lake Park. Owing to the expense of new material the company will use old rails and other materials on hand. This construction is permitted for a period of five years.

Southern Public Utilities Company, Charlotte, N. C.—Large track building and paving will be started soon by the Southern Public Utilities Company in Winston-Salem. The tracks on Liberty Street will be relaid for a distance of approximately one mile.

Power Houses, Shops and Buildings

Central Maine Power Company, Augusta, Me.—The Central Maine Power Company will build a new substation in Augusta at the corner of Bangor and Lock Streets. The new building will be of tapestry brick with a roof of green tile. The change in location has

given the company an opportunity to improve its local service by the addition of modern bus structures, new transformers and new wiring.

Detroit, Mich.—The Department of Street Railways, City of Detroit, has practically completed plans for the construction of a new office building, a car-house and outside storage for 200 cars, and a shop building capable of handling 500 cars. It is planned to construct these buildings this summer so that they will be ready for use by Sept. 1, at about which time 100 new safety cars are expected to be delivered from the manufacturers.

United Railways, St. Louis, Mo.—Contracts will be let in the next few weeks for a new substation and car house for the United Railways to take the place of an obsolete station on the North Side. The new buildings will cost approximately \$250,000. The management is completing the installation of two small automatic substations on St. Louis county lines, one a Westinghouse and the other a General Electric of 300 kw. capacity each. For the conversion of additional power needed on city lines four or five additional automatic stations aggregating 8,000 kw. capacity will be installed the latter part of the year, according to the plans of Col. A. T. Perkins, manager for the receiver. The two small stations, which cost approximately \$26,000 each, will be in service in a few weeks.

Professional Note

Ford, Bacon & Davis announce the opening of a Philadelphia office in the Morris Building, 1421 Chestnut Street. H. V. Coes will act as manager.

Trade Notes

Dahlstrom Metallic Door Company, Jamestown, N. J., has moved its New York City office from the Consolidated Gas Building, to suite 832, Cunard Building, 25 Broadway. The company reports business generally good throughout the country, but especially in the New York and Atlantic Coast district.

The Rome Wire Company, Rome, N. Y., has opened district offices at 50 Church Street, New York City, in line with the company's expansion of manufacturing facilities at Rome and at Buffalo, N. Y. The new office will be in charge of R. S. Hammond who has represented the company in the eastern territory during the last twenty years.

Raymond Roth has located at 30 Church Street, New York City, where he has opened a district sales engineering office, covering the central Atlantic district, representing Schweitzer & Conrad on switching and protection equipment, the G. & W. Electric Specialty Company for distribution specialties, the Hopewell Insulation & Manufacturing Company, and the MacGillis & Gibbs Company on cedar posts, poles and ties.

E. Jacobus Orange N. J. announces that after the introduction of the Jacobus vacuum lightning arresters on railroads of the United States it has been decided to prosecute the sale of this apparatus most extensively throughout the United States and Canada. Consequently the entire sale has been placed in the hands of the Multiple Electric Products Company, Inc., 450 Fourth Avenue, New York City, manufacturer of "Atlas" multiple fuses, through the offices and sales organization of which both this country and Canada will be covered.

"Ingeniería Internacional" Issues New Foreign Trade Bulletin.—*Ingeniería Internacional*, published by the McGraw-Hill Company, Inc., at Tenth Avenue and Thirty-sixth Street, New York, has issued Volume 1, Number 1, of "International Engineering," a foreign trade bulletin. Printed in English, its function and purpose are to show how American manufacturers may cement sound economic and commercial relations with the great potential market in the Spanish-speaking countries and to explain and interpret the work of *Ingeniería Internacional* in forwarding these purposes.

New Advertising Literature

Electric Hoists.—The Allis-Chalmers Manufacturing Company, Milwaukee, has issued bulletin No. 1819, covering its electric hoists.

Controllers.—General Electric Company, Schenectady, N. Y., has issued bulletin No. 44678-A describing the various kinds of drum-type controllers for railway service.

Switch Box.—The Multiple Electric Products Company, 450 Fourth Avenue, New York City, has developed a switch box for lighting circuits where exposed molding or conduit wiring is employed.

Excavators.—The new P. & H. shovel attachment for use with P. & H. types 205 and 206 excavator cranes is described in Pamphlet SX just published by the Pawling & Harnischfeger Company, Milwaukee.

Oil Circuit Breaker.—Type F-10 oil circuit breaker, with an interrupting capacity of 10,000 amp. per phase at 15,000 volts, has been put on the market by the Condit Electrical Manufacturing Company, South Boston 27, Mass.

Power Plant Piping.—The M. W. Kellogg Company, 90 West Street, New York City, has issued a 130-page illustrated catalog on power plant piping, embodying numerous tables.

Oil Circuit Breaker.—The Condit Electrical Manufacturing Company, South Boston 27, Mass., has placed on the market its type D-17 oil circuit breaker with resiliently suspended tanks in single units up to 1,200 amp. at 15,000 volts and up to 800 amp. at 25,000 volts.

Steel Sheet Piling.—Lackawana Steel Company, Buffalo, N. Y., has issued bulletin No. 109, containing 171 pages describing steel sheet piling.

"There is a PEACOCK Brake for every type of Car"

*Don't Just
Specify "Peacock
Brakes"*



If there is anyone more anxious than YOU are that your Peacock Brakes render perfect service, it is this Company. But we cannot be *certain* of this service if car builders order Peacock Brakes from us *without specifying the size*. This really happens more frequently than necessary. You may get small brakes for heavy cars or vice versa—which means trouble, delay, danger, dissatisfaction.

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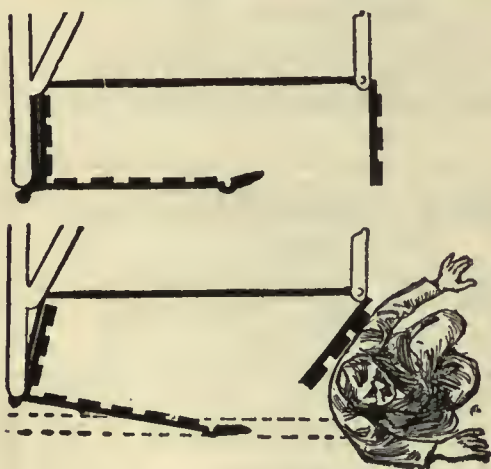
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Everywhere pole-buyers are enthusiastically receiving the P&H Guaranteed Penetration Process as the first and only process of Butt-Treatment that bears a definitely guaranteed result.

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GUARANTEED
One-Half Inch
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saves time and money*

THE picture shows how easy it is to renew a "Noark Renewable Fuse"—but the actual operation is still easier.

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To renew a blown link, simply unscrew the heavily knurled end caps and draw out the blades. The gun metal finish of the caps, washers and threaded ends prevents corrosion or the adherence of any metal that may be fused or vaporized when the link is blown. Pliers are never necessary to unscrew the end caps.

A screw-driver is all you need

to remove the two little screw bolts which hold the renewable link. Insert a new link and replace the cartridge, washers, and end caps. The renewing operation is then complete.

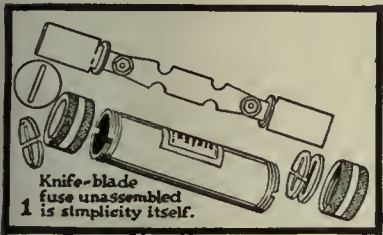
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look for the sturdy grey body and the *gun metal* finish of the knurled caps. By these characteristics you can recognize "Noark" Renewable Fuses anywhere. Their individuality is clearly apparent and classifies them as the dependable fuse protection you need.

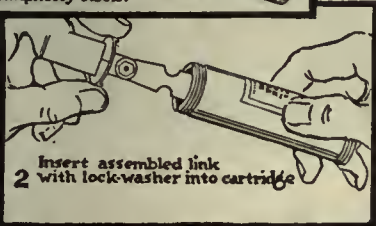
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"Noark" renewable and non-renewable cartridge-enclosed fuses, in all standard capacities, are approved by the Underwriters' Laboratories, Inc., under the label service.

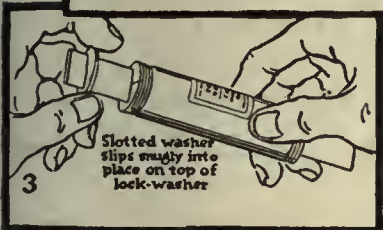
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Knife-blade fuse unassembled
1 is simplicity itself.



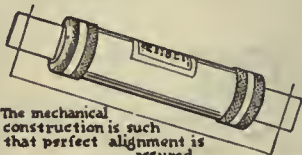
Insert assembled link
2 with lock-washer into cartridge



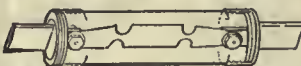
Slotted washer
3 slips snugly into
place on top of
lock-washer




All that remains is to
4 screw on brass cap tightly.



The mechanical
5 construction is such
that perfect alignment is
assured



Fuse will blow at pre-determined
6 overload because link is
scientifically calibrated



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Through—
Asbestos
and its allied products
JOHNS-MANVILLE
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Heat Insulations, High
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INCREASE SCHEDULE SPEEDS

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Prevent Abuse with P.M. Coupon Transfers

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In severest test,
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Have proven best."*



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The series lighting conductor is run from pole top to pole top eliminating the use of expensive, troublesome underground cable.

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St. Louis, Mo.*

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This performance absorbs all shock and vibration, thereby giving longer life to the gears and to the equipment from which, and to which, power is transmitted.

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R.D. NUTTALL COMPANY
PITTSBURGH  PENNSYLVANIA

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Nuttall

Can You Afford

not to use the best gears obtainable? Constant replacements and delays are expensive.

Yet they are inevitable when inferior gears are used.

Carnegie Steel Gear Blanks

are made by a special forging process. Their manufacture from quarry to finished product is under the supervision of skilled workmen and trained metallurgical engineers—and back of this is the purpose to produce only the best that can be made.

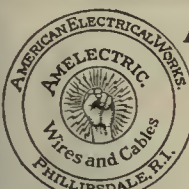
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Owing to popular demand leading gear cutters carry these blanks in stocks. They are made in a range of 6 to 44 inches in diameter, 25 pounds minimum weight. To insure maximum service and efficiency, on your next order of gears from your gear cutter—

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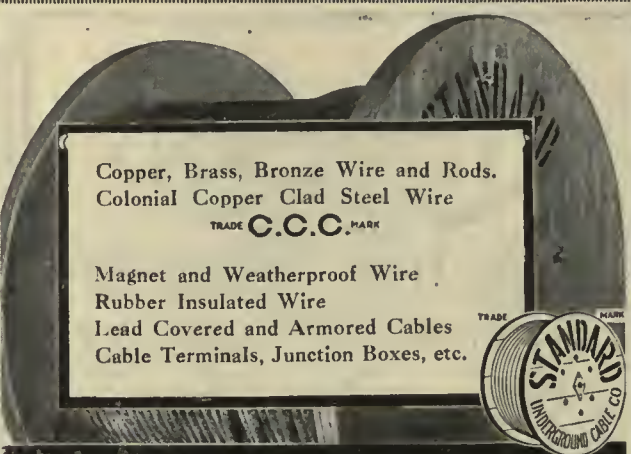
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Ask for "NATIONAL" Bulletin No. 14—

"NATIONAL"
TUBULAR STEEL POLES

—free, on request, to electric traction engineers

NATIONAL TUBE COMPANY PITTSBURGH, PA.

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FISHER BLDG., CHICAGO
"The Shippin' Fools"
RAILROAD TIES, SWITCH TIES and CROSSING PLANK



LUMBER

TIES—TIMBERS—POLES—PILING
DUNCAN LUMBER COMPANY, Portland, Oregon

Specialists in Street Railway Requirements
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IMPERIAL RIVETED CORRUGATED CULVERTS

IMPERIALS are shaped and riveted with the utmost care. Because of this they are able to give that long, dependable service which you expect of a culvert made from Toncan Metal.

We can make very prompt shipments. Write for delivered prices.

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MANUFACTURERS
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SWITCHES—MATES—FROGS—CROSSINGS
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IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

SPECIAL TRACKWORK

Of the well-known **WHARTON** Superior Designs
and Constructions

STEEL CASTINGS
CONVERTER AND
ELECTRIC

FORGINGS
DROP, HAMMER
AND PRESS

GAS CYLINDERS
SEAMLESS
STEEL

WM. WHARTON JR. & CO., Inc., Easton, Pa.
(Subsidiary of Taylor-Wharton Iron & Steel Co., High Bridge, N. J.)

ORIGINATORS OF
MANGANESE STEEL IN TRACKWORK

ERICO RAIL BONDS



Assure higher efficiency in track return. Applied with Erico Arc Weld Equipment or any standard equipment.
Details upon request.

The Electric Railway Improvement Co.
Cleveland

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors

SYRACUSE, N. Y.

Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company
PITTSBURGH, PA.



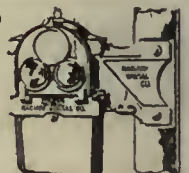
U. S. Electric Contact Signals for

Single-track block-signal protection
Double-track spacing and clearance signals
Protection at intersections with wyes
Proceed signals in street reconstruction work
United States Electric Signal Co.
West Newton, Mass.

AUTOMATIC SIGNALS

for Electric Railways
Highway Crossing Bells
Headway Recorders

NACHOD SIGNAL COMPANY, Inc.
LOUISVILLE, KY.



COPPER CLAD STEEL COMPANY

OFFICE AND WORKS.
RANKIN, PA. BRADDOCK P.O. WESTERN SALES REPRESENTATIVES:
STEEL SALES CORPORATION, CHICAGO, ILL.
NEW YORK SALES OFFICE: 30 CHURCH STREET, NEW YORK CITY

COPPERWELD Wire—a non-corroding electrical conductor
8% Lighter—50% Stronger than Copper.



Aladdin's Lamp has nothing on the "Searchlight"

When an advertiser sells equipment for over \$4,000.00 through "Searchlight" advertising that cost \$12.00, we think "Searchlight" is at least entitled to "favorable mention."

Searchlight Section

Employment — Equipment — Business Opportunities



NILES-BEMENT-POND CO.

111 BROADWAY, NEW YORK

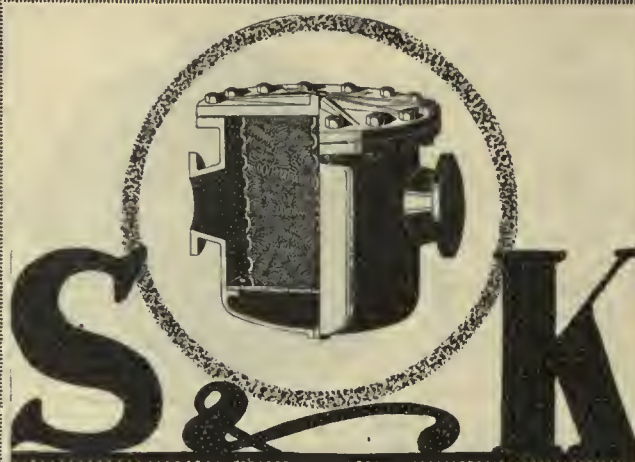
MACHINE TOOLSFOR ELECTRIC
RAILWAYS

Axle Lathes
Wheel Presses
Car Wheel Lathes
Boring Mills
Lathes
Hammers
Cranes
General Machine Tools

**BARBOUR-STOCKWELL CO.**205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

**Adhesion
Oilseparator.***Large Surface Exposed To Steam,**Highest Efficiency For Separating Oil From Steam,**Excess Area Eliminating Backpressure.***SCHUTTE & KOERTING**

Company

1155 Thompson St. Philadelphia, Pa.

A Wrench that IS a Wrench

The strongest and most durable heavy-duty screw wrench made—the W & B "Railroad Special." Head and bar drop-forged in one piece; jaw extra heavy and thoroughly casehardened. Fitted with indestructible iron handle and easy-acting solid steel screw.

Seven sizes, from 6 to 21 in.; maximum capacity of opening, 3 15/16 in. Guaranteed.

*Screw Wrench Book on request.***J. H. WILLIAMS & CO.***"The Wrench People"*

BROOKLYN BUFFALO CHICAGO
143 Richards St. 143 Vulcan St. 1143 W. 120th St.



IN 1898

STEAM SUPERHEATERS

Were introduced commercially in the United States by this Company. Owners of boilers it has built—Babcock & Wilcox, Stirling and Rust—not now equipped with these coal-saving accessories can obtain information about superheating possibilities from the nearest office listed below.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

BOSTON, 49 Federal Street
PHILADELPHIA, North American Bldg.
PITTSBURGH, Farmers Deposit Bank Bldg.
CLEVELAND, Guardian Bldg.
CHICAGO, Marquette Building
CINCINNATI, Traction Bldg.

ATLANTA, Candler Bldg.
TUCSON, ARIZ., 21 So. Stone Avenue
NEW ORLEANS, 533 Baronne Street
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705-6 Kearns Bldg.
HONOLULU, H. I., Castle & Cooke Bldg.

SAN FRANCISCO, Sheldon Bldg.
LOS ANGELES, 404-406 Central Bldg.
SEATTLE, L. C. Smith Bldg.
HAVANA, CUBA, Calle de Aguiar 104
HOUSTON, TEXAS, Southern Pacific Bldg.
SAN JUAN, PORTO RICO, Royal Bank Bldg.

Registers International

International Fare Registers. Single registers, round and square; double registers, duplex counters, car fittings. Exclusive selling agents for HEEREN ENAMEL CAP AND COAT BADGES.



The International Register Co.
15 South Throop Street, Chicago

Type R5

HIGH SPEED MONEY CHANGERS

The new
1921 model
—without
rivets—
ready for
delivery



Supplied
in one
or four
tube
combination

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them. Prices and literature sent on request.

J. L. GALEF, 75 Chambers St., New York City
Exclusive Manufacturers' Selling Agent

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, $3\frac{1}{2}$ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.

Second and Diamond Sts., Philadelphia

WE-FU-GO AND SCAIFE

WATER

PURIFICATION, SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

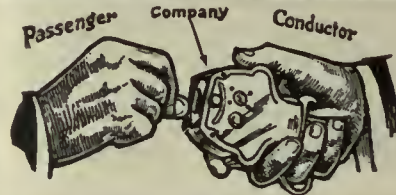
Over twenty lines having from two to eight zones collect fares with the aid of

Cleveland Fare Boxes

Let us explain

The Cleveland Fare Box Company
CLEVELAND, OHIO

The Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario



Direct
Automatic
Registration

By the
Passengers
Rooke Automatic
Register Co.
Providence, R. I.



Use them in your terminals—
PEREY TURNSTILES
or PASSIMETERS

Faster than the ticket seller

Perey Manufacturing Co., Inc.
30 Church Street, New York City

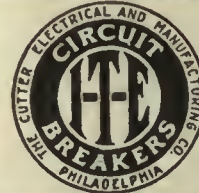
Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company
Carlisle, Pa.



Economical
in the
Long Run
BONNEY-VEHSLAGE
TOOL CO.
Newark, N. J.



I. T. E. Circuit Breakers

for heavy street railway work are
the best obtainable. Write for New
Complete Catalogue.

SPECIFY

THE TERRY TURBINE

For Driving Your Auxiliaries

TERRY STEAM TURBINE CO.
Hartford, Conn

BAKELITE-DILECTO

The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

The Continental Fibre Co., Newark, Delaware

Branch Offices:

CHICAGO, 322 S. Michigan Ave. NEW YORK, 252 Broadway
Pittsburgh Office, 361 Fifth Ave. San Francisco Office, 525 Market St.
Los Angeles Office, 411 S. Main St.
Canadian Office, 1716 Royal Bank Bldg.,
Cor. King and Yonge Sts.
Toronto, Ont.

FOSTER SUPERHEATERS

A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

Power Specialty Company Boston Chicago Philadelphia San Francisco Pittsburgh London, Eng. 111 Broadway, New York

HASKELITE

The Plywood made with waterproof glue

An Engineering Material
used by car builders

for

Roofs
Headlining

Side Panels
Ceilings

Bottoms and Backs of Seats

Write for Samples and Prices

HASKELITE MANUFACTURING CORP.
133 W. Washington St., Chicago, Illinois

Reduce Commutator Wear and Losses Due to "Tie-Ups"

To be absolutely safeguarded against excessive commutator wear—assured of real mileage day in and day out—and to obtain lower operating costs, use

Columbia Pyramid Brushes

the brushes that were made to suit the commutator and the service.

You name the job—we'll name the brush

National Carbon Company, Inc.
Cleveland, Ohio

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

When you want Men

put your advertising for them on the same basis as other publicity.

If you want competent and efficient assistants, experienced in the field served by this journal, you will naturally find such men among our readers—which include the keenest and most progressive men in the industry.

Get in touch with a number of these men and select the one that is best suited for your needs.

SEARCHLIGHT SECTION


Only \$2.00 for 25 words 806

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDERED
TRIPLEX

*Send for new
Rail Bond book*

American Steel & Wire
CHICAGO
NEW YORK
Company



**MORE-JONES
"TIGER-BRONZE"
AXLE
AND ARMATURE
BEARINGS**

*Not always the cheapest, but ever
lowest in ultimate cost*

MORE-JONES BRASS & METAL CO.
St. Louis, Missouri.

Bound Brook Trolley Wheel Bushings Give Longer and Better Service

THERE are more Bound Brook (Oil-less) Trolley Wheel Bushings in use today than all other makes combined. That is because Bound Brook Bushings, by virtue of their construction, invariably outlast all other types.

*All Genuine Graphited Oil-less Bushings have
always been made at Bound Brook, U. S. A.*

BOUND BROOK OIL-LESS BEARING COMPANY
Bound Brook, New Jersey Detroit Office: 1723 Ford Bldg.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut



Think "SEARCHLIGHT" First

ADVERTISING RATES

POSITIONS VACANT—Business Opportunities and other undisplayed ads, 8 cents a word, minimum \$2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:
1 to 3 in., \$4.50 an in. 15 to 29 in., \$3.90 an in.
4 to 7 in., \$4.30 an in. 30 to 49 in., \$3.80 an in.
8 to 14 in., \$4.10 an in. 50 to 99 in., \$3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

CIVIL engineer wanted for suburban electric railway property in Central Pennsylvania. Must be all around handy man. P-891. Elec. Ry. Journal, Real Estate Trust Bldg., Phila.

CIVIL engineer, street railway, way department, technical graduate preferred, experienced in track surveys, estimates and construction. State education, experience, references and salary expected. P-890, Elec. Ry. Journal.

TIMETABLE maker, able, ambitious, experienced; state qualifications, experience and salary expected. Chicago Surface Lines, 604 Borland Bldg., Chicago.

POSITIONS WANTED

DRAUGHTSMAN experienced in street railway rolling stock work, desires change of position. Now employed. PW-889, Elec. Ry. Journal, Real Estate Trust Bldg., Phila.

FREIGHT manager: Young man with proven executive ability, 11 years of sound business experience and thoroughly familiar with trolley freight problems. Will consider a change of position. Now employed as chief clerk of freight service in large Eastern street railway corporation. PW-886, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

GENERAL foreman car construction; 25 years' experience. Can furnish best of references, from past and present employers. PW-894, Elec. Railway Journal.

MANAGER or superintendent—Experience in the management, construction and maintenance of electric railways. Can handle public and men. Large experience on appraisal of all classes of public utilities would like to become connected with property that needs building up, or one that wants appraisal made. PW-897, Electric Railway Journal, Leader-News Bldg., Cleveland.

MASTER mechanic—11 years' experience on electrical and mechanical equipment, city and interurban railways. Maintenance, installing and repair of new and old equipments; age 32; married; go anywhere. PW-899, Elec. Railway Journal, Old Colony Bldg., Chicago.

MIDDLE aged man, experienced in carpenter, cabinet, millwork and car repair, also armature winding and some machine shop experience. Desires steady position with an electrical railway company; best references. PW-893, Elec. Ry. Journal.

OPEN for position; 12 years' experience as foreman on electrical and mechanical equipment on city and interurban railways. PW-890, Elec. Railway Journal, Old Colony Bldg., Chicago.

VALUATION engineer, graduate E. E., University of Illinois. Completing valuation work for large public utility—street railway, gas, electric, water, ice and steam heat properties. Four and one-half years' experience, maintenance, construction, valuation in U. S. A. and abroad. PW-895, Elec. Railway Journal, Old Colony Bldg., Chicago.

POSITIONS WANTED

VALUATION engineer—Experience in valuation of electric railways, electric light and power properties. Also experienced in management, construction and maintenance of electric railway properties. PW-896, Elec. Railway Journal, Leader-News Bldg., Cleveland.

WORK WANTED

Work Wanted

Special track work only; examinations, reports, estimates, surveys, plans, specifications, purchasing and supervision; first-class work only, solicited by expert. WW-877, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

FOR SALE

1½ to 2-ton Winther AUTO TRUCK

Model 39—1919

Sewall Cushion Wheels. Tires in fair condition.

Covered express body with platform tower adjustable from 11-ft. to 16-ft. above ground. In running condition—needs painting. Trucks suitable for overhead trolley repair and construction work or street light trimming and lamp renewals.

For examination call on F. S. Freeman, Supt. of Power, 439 Albany St., Boston, Mass.

Proposals should be mailed to Boston Elevated Railway Co., Edward Mahler, Purchasing Agent, 108 Mass. Ave., Boston

SALES ENGINEER

34 years of age, is looking for a permanent connection with some street railway supply concern or manufacturers. Has held two positions during last 15 years—9 years track engineering and 6 years successful sales and sales organization work. Wide acquaintance among street railway engineers and executives throughout the country. Not afraid of hard work. Will gladly furnish any information and best of references.

PW211—Electric Railway Journal
1570 Old Colony Bldg., Chicago, Illinois

FOR SALE

Property and Equipment for Sale

The property and equipment of the former Norfolk & Bristol Street Railway; 2 miles located in Norwood, Walpole, Foxboro, Wrentham and Mansfield, State of Massachusetts; consisting of 60-pound rails, 90-pound girder rails, overhead equipment, power house and equipment car barn, rolling stock, electrical railway supplies, real estate, right of way and franchises; to be sold as a whole or in parcels, purchaser to take property where it is and remove it. Address John K. Howard, Esq., 55 Congress Street, Boston, Mass.

FOR SALE

TRANSFORMERS

1—Type H, Form RP, Cycles 60, 200 KVA., 19100/33000Y—2300 Oil Cooled, Step Up Transformer.

1—220 Volt (B) KW., 60 Cycle, Oil Cooled, Step Up Transformer. 19100/33000Y—2300.

4—Type HS, Form RT, Cycles 60, 135 KVA., 17100/19100/33000Y—370/370/185, Oil Cooled Step Down Transformers.

All filled with oil and in excellent shape.

UNION TRACTION CO.
Nashville, Tennessee

WANTED

PORTABLE SUB-STATION

Either Motor Generator or Rotary Converter, 200 Kw.,—550/600 volts D.C. Suitable for 2300 volts A.C. operation.

Brockton & Plymouth St. Ry. Co.
HOLLIS T. GLEASON, Receiver
Plymouth, Mass



WE'VE GOT 'EM!

No. 1 Relaying Rails and Angle Bars for Immediate Shipment

30 lb., 40 lb., 50 lb., 56 lb., 60 lb.,
68 lb., 70 lb., 80 lb., 90 lb.

WRITE OR WIRE FOR QUOTATIONS STATING TONNAGE and DESTINATION

NEW—80-LB. RAIL and ACCESSORIES A. R. A.
"TYPE B" RAIL
Approximately 30,000 gross tons—Standard Lengths—Stored at Kearney, N. J.

HYMAN-MICHAELS COMPANY

NEW and RELAYING RAILS

Peoples Gas Building, Chicago, Illinois

New York Office:
1324-1326 Woolworth Bldg.

Pittsburgh Office:
1312 First National Bank Bldg.

St. Louis Office:
2115 Railway Exchange Bldg.

We buy electric and steam railways that are to be dismantled



In Stock
for
Immediate Shipment



**Turbo Units, Rotary Converters,
Transformers, Motor
Generator Sets, Dynamos
and Motors**

ARCHER & BALDWIN, Inc.
114-118 Liberty St., New York City
Tel.: 4337-8 Rector

FOR SALE

Generating Unit

1—480-hp., 100-r.p.m., 150-lb.
pressure Bates Corliss Engine
direct connected to 325 kw.
D.C. generator, 550-volt
Westinghouse, 100-r.p.m. with
panel.

Central Illinois Public Service Co.
D. R. Truox, Purchasing & Stores Agent
Mattoon, Illinois

FOR SALE

1,000—31 in. New Rolled Steel Wheels. Blue
Print and price will be furnished on applica-
tion.
10,000-lbs. No. 10 D.C.C. Magnet Wire.
100-lbs. No. 30 D.C.C. Magnet Wire.
500-lbs. No. 12 D.C.C. Magnet Wire.
150-lbs. No. 6 Flat D.C.C. Magnet Wire.
3,000-ft. No. 1—7 Strand Single Braid Cable,
N. E. C. Specifications.
10,000-ft. No. 1—19 Strand Single Braid Cable,
N. E. C. Specifications.
2,100-lbs. $\frac{3}{4}$ in. x .007 Yellow Bias Varnished
Insulating Tape, in 5 $\frac{1}{2}$ in. rolls.
300-lbs. No. 3 White Cotton Sleeving—Hope and
Anchor.
10—Canopy Switches—Westinghouse Electric
Company's Type 503-C, Style No. 83805.

Philadelphia Rapid Transit Co.
Purchasing Department
820 Dauphin Street, Philadelphia, Pa.

At A Sacrifice

14 Westinghouse Railway
68 and 68 C

MOTORS
complete

10 and 13 inch Railway Bonds
H. E. SALZBERG CO., Inc.
30 Church St., New York

For 20 Years

we have been
Buying and Selling
Second-Hand Cars
Trucks and Motors

At Your Service
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

Get YOUR wants into the SEARCHLIGHT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Circuit Breakers
Condit Electrical Mfg. Co.

Air Receivers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Carnegie Steel Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Brass & Metal Co.

Babbitt Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
National Carbon Co., Inc.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.
Bearings, Oilless, Graphite, Bronze
and Wood
Bound Brook Oil-less Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes, Junction and Outlet
National Metal Molding Co.

**Brackets and Cross Arms (See also
Poles, Ties, Posts, Etc.)**
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

**Brakes, Brake Systems and Brake
Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.

Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville, Inc.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Brass & Bronze Products
American Copper Products Corp.

Bridges and Buildings
American Bridge Co.

Brooms, Track, Steel or Rattan
American Rattan & Reed Mfg. Co.
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
National Carbon Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Graphite
National Carbon Co., Inc.

Bunkers, Coal
American Bridge Co.

Bus Bars
American Copper Products Corp.

**Bushings, Case Hardened and
Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
National Metal Molding Co.

Bushings, Graphite and Wooden
Bound Brook Oil-less Bearing Co.

Cables (See Wires and Cables)
Carbon Brushes (See Brushes,
Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

**Cars, Passenger, Freight, Express,
etc.**
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

**Castings, Brass, Composition or
Copper**
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Ackley Brake & Supply Corp.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car
Pantaso Co.

Change Carriers
Galef, J. L.

Circuit Breakers
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

**Clamps and Connectors for Wires
and Cables**
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

**Cleaners and Scrapers—Track (See
also Snow-Plows, Sweepers and
Brooms)**
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

**Coal and Ash Handling (See Con-
veying and Hoisting Machinery)**

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
Electric Service Supplies Co.

Colls, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Colls, Choke and Kieking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Traction Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koertling Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Conduits, Interior
National Metal Molding Co.

Conduits, Underground
Johns-Manville, Inc.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Allison & Co., J. E.

Conveying and Hoisting Machinery
American Bridge Co.
Columbia M. W. & M. I. Co.

Copper Products
American Copper Products Corp.

Copper Wire
Asaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Belt, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebing's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Cranes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

**Crossing Signals (See Signals, Cross-
ing)**

Crossings, Frog and Switch
Wharton, Jr., & Co., Wm.

**Crossings, Track (See Track, Speed-
Work)**

Crushers, Rock
Allis-Chalmers Mfg. Co.

Culverts
Canton Culvert & Silo Co.

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Brill Co., The J. G.
Electric Service Supplies Co.
Pantaso Co.
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg. Co.
Johns-Manville, Inc.

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Archer & Baldwin
Cleveland Armature Works
Electric Equipment Co.
Foster Co., H. M.
Hyman Michaels Co.
Karaski, Friedman & Co., Inc.
Reading Engineering Co.
Transit Equip. Co.

**Derailing Devices (See also Trac-
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Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc.
Walter A.

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American Steel & Wire Co.
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Archbold-Brady Co.
Arnold Co., The
Beeler, John
Clark & Co., Mgr., Corp., E. W.
Day & Zimmermann
Feustel, Robert M.
Ford, Bacon & Davis
Gould, L. E.
Hemphill & Wells
Holst, Englehardt W.
Horton, Barker & Wheeler
Jackson, Walter
Parsons, Klapp, Brinkerhoff &
Douglas
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Smith & Co., C. E.
Stone & Webster
White Engineering Corp., The J. G.

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Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

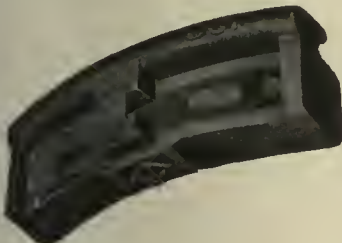
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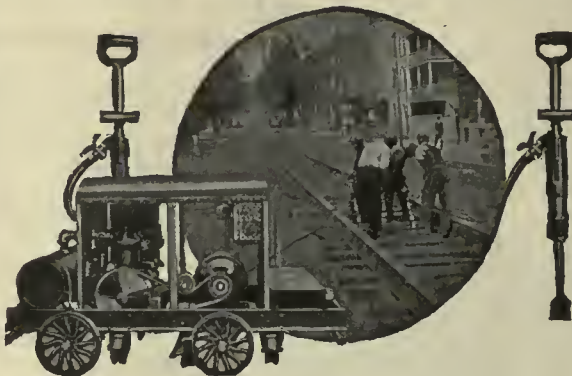
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Electric Service Supplies Co.

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Johns-Manville, Inc.

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American Abrasive Metals Co.

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Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
Williams & Co., J. H.

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Johns-Manville, Inc.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

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Columbia M. W. & M. I. Co.
General Electric Co.

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Power Specialty Co.
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Westinghouse Elec. & Mfg. Co.

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Brill Co., The J. G.

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Standard Steel Works Co.

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Westinghouse Elec. & Mfg. Co.

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General Electric Co.
National Railway Appliance Co.
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Tool Steel Gear & Pinion Co.

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General Electric Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Green Eng. Co.

Greases (See Lubricants)

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Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

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American Bridge Co.

Guards, Trolley
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Ohio Brass Co.

Harpa, Trolley
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

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General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

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Haskelite Mfg. Co.
Pantasote Co.

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Consolidated Car Heating Co.
Economy Electric Devices Co.

Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

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Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

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Niles-Bement-Pond Co.

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Ingersoll-Rand Co.

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Ohio Brass Co.

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Niles-Bement-Pond Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Johns-Manville, Inc.
Okonite Co.
Standard Underground Cable Co.
Westinghouse Elec. & Mfg. Co.

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Okonite Co.
Westinghouse Elec. & Mfg. Co.

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Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Hubbard & Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Niles-Bement-Pond Co.

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General Electric Co.
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Westinghouse Elec. & Mfg. Co.

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Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
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Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Galena-Signal Oil Co.

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Niles-Bement-Pond Co.

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Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
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National Metal Molding Co.

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Motormen's Seats
Brill Co., The J. G., The
Electric Service Supplies Co.
Wood Co., Chas. N.

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Westinghouse Elec. & Mfg. Co.

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Nelsonville Brick Co.

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Ohio Brass Co.

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Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

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Ohio Brass Co.
Westinghouse Traction Brake Co.

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National Tube Co.

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Standard Steel Works Co.
Westinghouse Traction Brake Co.

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Hubbard & Co.

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Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
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Duncan Lumber Co.
Page & Hill Co.

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Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.

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Electric Railway Equipment Co.
National Tube Co.

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Duncan Lumber Co.
Page & Hill Co.

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Okonite Co.

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Economy Electric Devices Co.
National Ry. Appliance Co.

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Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

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Schutte & Koerting Co.

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Bonney-Vehslage Tool Co.
International Register Co., The
Wood Co., Chas. N.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Electric Service Supplies Co.

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Resistance, Wire and Tube
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Ohio Brass Co.
St. Louis Car Co.

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Brill Co., The J. G.
Hubbard & Co.

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Consolidated Car Heating Co.
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National Pneumatic Co., Inc.

Signal Systems, Block
Electric Service Supplies Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Stag
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More-Jones Brass & Metal Co.
Nuttall Co., R. D.

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Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.
Johns-Manville, Inc.

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Solderless Connectors
Frankel Connector Co.

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Splicing Compounds
Westinghouse Elec. & Mfg. Co.

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Spray Nozzles
Schutte & Koerting Co.

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American Steel Foundries
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
Standard Steel Works Co.

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Brill Co., The J. G.
St. Louis Car Co.

Steel Castings
Wharton, Jr., & Co., Wm.

Steps, Car
American Abrasive Metals Co.
American Mason Safety Tread Co.

Strand
Copper Clad Steel Co.
Roebbing's Sons Co., J. A.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse Elec. & Mfg. Co.

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Power Specialty Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

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Ramapo Iron Works

Switches, Track (See Track Special Work)

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Johns-Manville, Inc.

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Anderson Mfg. Co., A. & J. M.
Condit Electrical Mfg. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville, Inc.
Westinghouse Elec. & Mfg. Co.

Tampers, Tie
Ingersoll-Rand Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Telephones and Parts
Electric Service Supplies Co.

Terminals, Cable
Standard Underground Cable Co.

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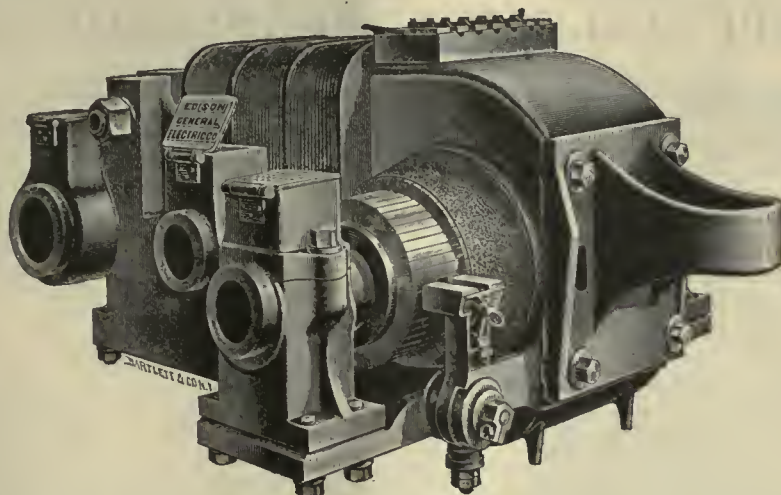
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at Terminal in
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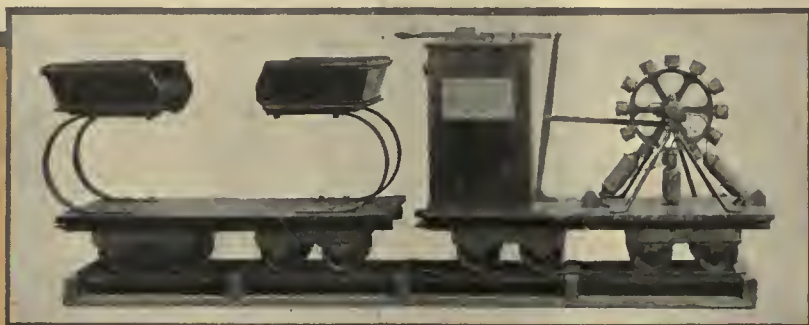


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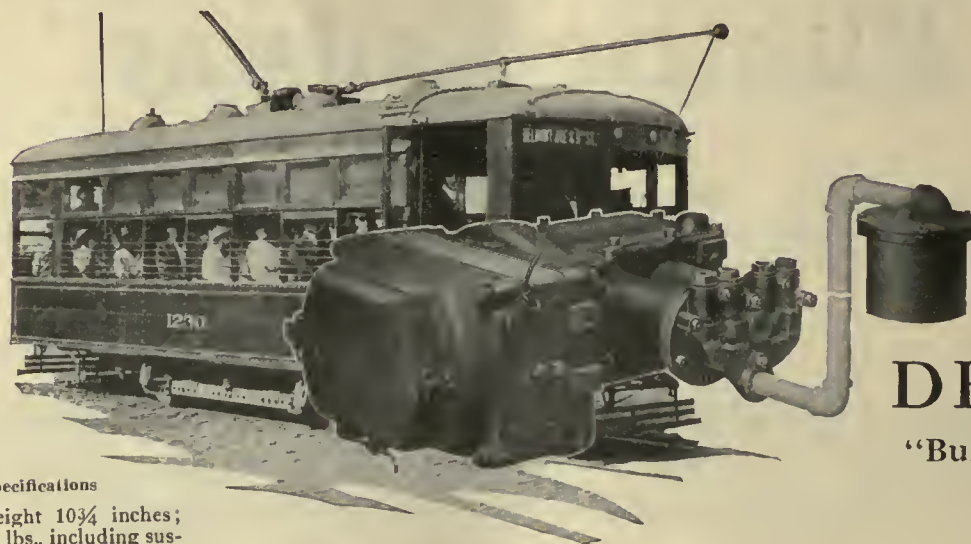
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Circulation of this issue, 6,250

A Superior Air Compressor for the Small Car



DH-10
"Bungalow"

Specifications

Overall height 10 $\frac{3}{4}$ inches;
weight 420 lbs., including sus-
pension irons, brackets and
bolts; displacement 10 cu. ft.
per minute when operating
against 100 lbs. on 600 volts.

WHEREVER LIGHT EQUIPMENT IS USED

THE DH-10 "Bungalow" has established itself as the most serviceable 10-foot Compressor in the Traction Field. As a small machine, designed especially for small, low-built, light-weight cars, it has appealed generally to electric railway operators who appreciate the importance of keeping their equipment nicely "balanced" so as to insure the greatest possible economy consistent with safety and efficiency.

AN INEXPENSIVE UNIT

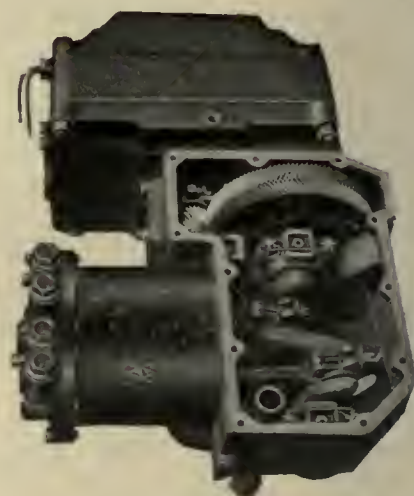
Owing to its high-class construction and superior service, the DH-10 is recognized as an attractive investment from the financial standpoint.

It materially reduces the expense of up-keep usually attaching to the ordinary compressor; is easy to assemble, permits ready access to all working parts, requires but slight attention, possesses the highest degree of durability—these features all combining to make for extremely low maintenance cost.

The design permits continuous operation for extended periods without possibility of a dangerous rise in temperature.

Send for Publication No. 9045

Note:—The complete line of Bungalow Compressors includes three sizes of 10, 16 and 25 cubic feet displacement, the designations of these being DH-10, DH-16 and DH-25.



POSITIVE LUBRICATION

An ingenious carrying system insures a constant and well-regulated distribution of oil over all the working parts. Such adverse conditions as low speed and diminished oil supply in the crank case have no effect on the efficiency of this arrangement. It is positive in every respect.

Westinghouse Traction Brake Company

General Offices and Works: Wilmerding, Pa.

"Fourteen Miles East of Pittsburgh"

New York
San Francisco

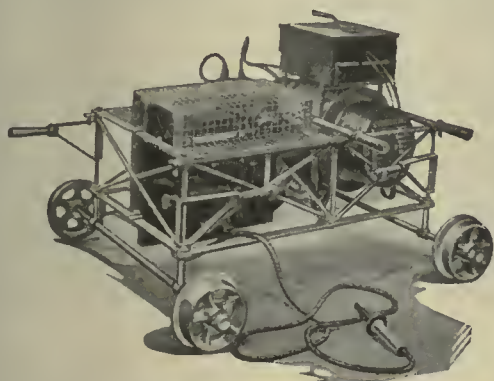
Washington
Pittsburgh

Chicago
St. Louis

Good Bonding Is an Economy —Not an Expense



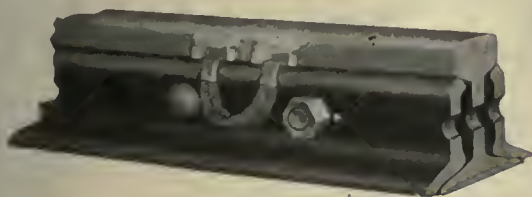
A Good Method for Good Bonding



Wilson **Plastic-Arc** Rail Bond Welder brings the soundest principles of electric welding to rail bonding and track work.

It teaches—and enforces—correct welding.

The Wilson machine is capable of continuous welding duty at full rated capacity. It can be used for rail bonding, splice bar welding and shop work. Distributed exclusively by The Ohio Brass Company.



O-B Type AW3 Bond
Patented

Has four fundamental features which speed the welding and improve the job

Especially at today's low prices, good bonds are a profitable investment for you.

Motors limp and burn out on the low voltage which results from a poor return circuit. One medium sized property was spending two thousand dollars every month on motor repairs until O-B Bonds went on the rails.

Money—cash—dribbles out of every high resistance track joint. Good bonding stops that.

Dim lights, slow schedules, electrolysis are all caused by a poor track return. Good bonding is the answer.

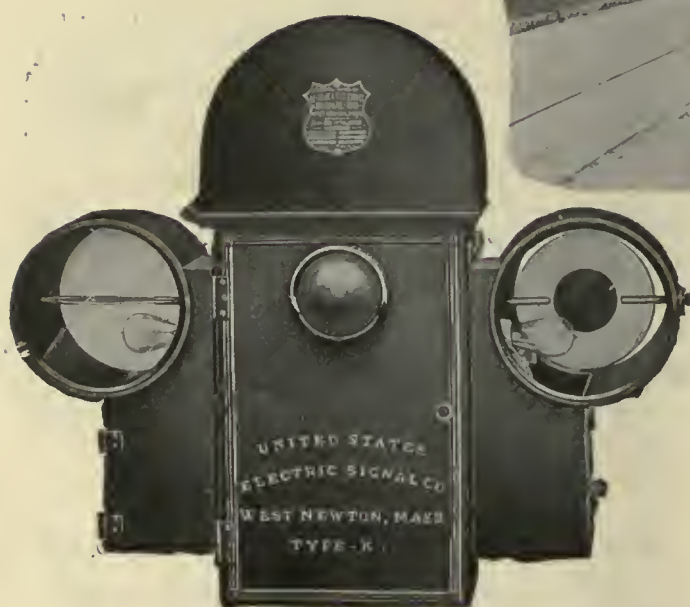
O-B Bonds are good bonds. All types, all sizes, prompt shipment. See pages 446-508 Catalog No. 18.

The Ohio Brass Company, Mansfield, Ohio

New York Philadelphia Pittsburgh
Chicago Los Angeles San Francisco
Paris, France



Manufactures: Rail Bonds; Trolley Materials; High Tension Porcelain Insulators; Third Rail Insulators; Electric Railway Car Equipment.



As essential as the
safety car on your
line today—

U. S. Electric Signals

With the high speed schedules and close headway of the safety car it is imperative that you use Signals.

The Signal best suited to your requirements is the one that is big, reliable and clearly discernible day and night. One so installed that the first car to reach the cut-in contactor will have the right of way.

Those signals are U. S. Electric Signals, that prevent instead of cure.

Backed by a Generation of Signal Specification

United States Electric Signal Company
West Newton, Massachusetts

Representatives:

Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Services Supply Co., Salford, England





Why Do Pennsylvania Concrete Road Specifications Call for 56 Pounds of *Effective* Steel per 100 Square Feet

Because Engineers know that only effective steel, (that is that steel actually under stress) adds strength to any structure.

When specifications for Steel Ties for paved street track construction call for the maximum effective steel per foot of track INTERNATIONAL STEEL TWIN TIES are indicated.

STEEL TWIN TIES offer the maximum of effective steel because of the twin feature, (protected by American, Canadian and foreign patents) which combines a longitudinal plate-bearing with reinforcing tie members.

If part of your maintenance appropriation is spent for effective steel it will be well spent. It buys you effective ties which build effective track.

Track plans, data and delivery prices forwarded when you request.

The International Steel Tie Company

16702 Waterloo Road, Cleveland, Ohio

International Products:—Steel Twin Ties; Steel Crossing Foundations; and Steel Paving Guard; are manufactured and sold in Canada by the Sarnia Bridge Company, Ltd., Sarnia, Ont.

Steel Twin Tie Track

UNION Style "L" Color Light

SIGNALS

Controlled by Continuous

A.C. TRACK CIRCUITS

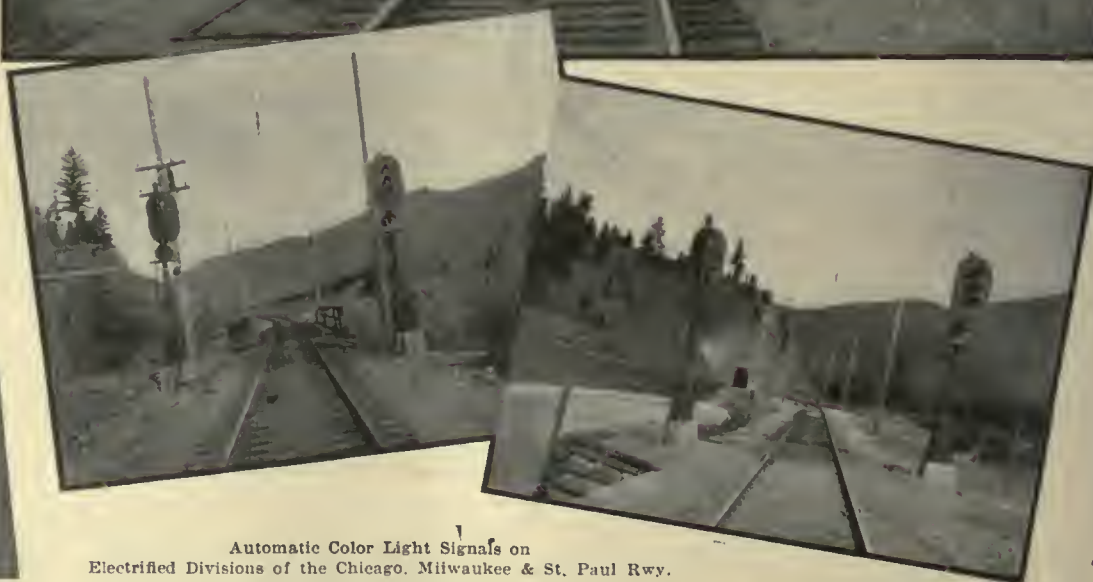
Make

MAXIMUM OPERATING SPEED

Possible with

ABSOLUTE SAFETY

To the important freight and passenger traffic now moving over the entire 660 miles of the St. Paul's electrified divisions through the Rockies and Cascade Range.



Automatic Color Light Signals on
Electrified Divisions of the Chicago, Milwaukee & St. Paul Rwy.

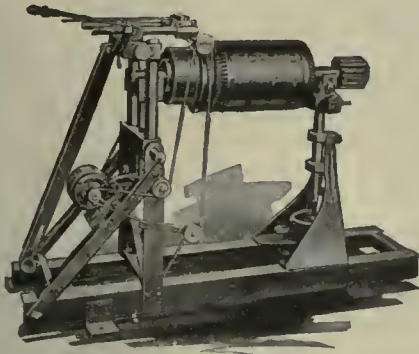
"Union" Standard Uniform Equipment Throughout



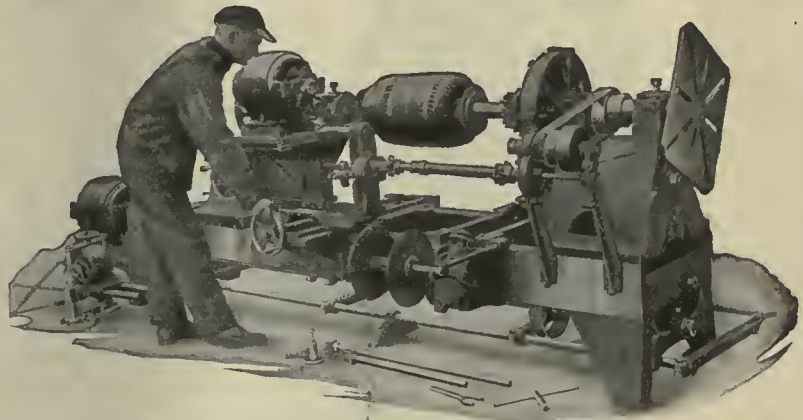
Union Switch & Signal Co.

SWISSVALE, PA.





This heavy duty Peerless Commutator Slotting Machine is typical of the many Peerless Tools. The Peerless line consists of separate machines for making the different repairs and the Universal Machine, illustrated on right.



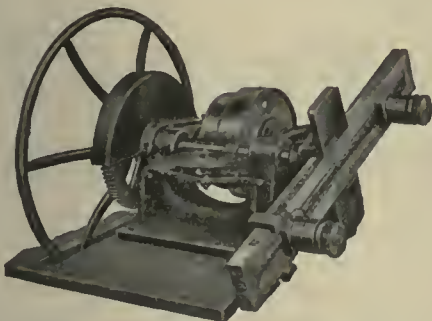
This Peerless Universal Armature Machine is practically a complete Armature Repair Shop in itself. In practice an armature that has had the coils placed in the slots and leads soldered to the commutator may be put in this machine and the work completed with greatest possible efficiency and without removing the armature from the machine.

Peerless and Segur Armature Shop Tools

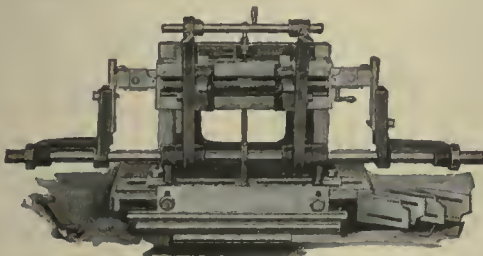
A complete line of tools for Winding, Slotting, Grinding and Banding Armatures and for the manufacture of Armature and Field Coils.

You can completely equip your Armature Shop from this line and with such an installation you can greatly speed up your Armature Repairs and very materially decrease your labor cost.

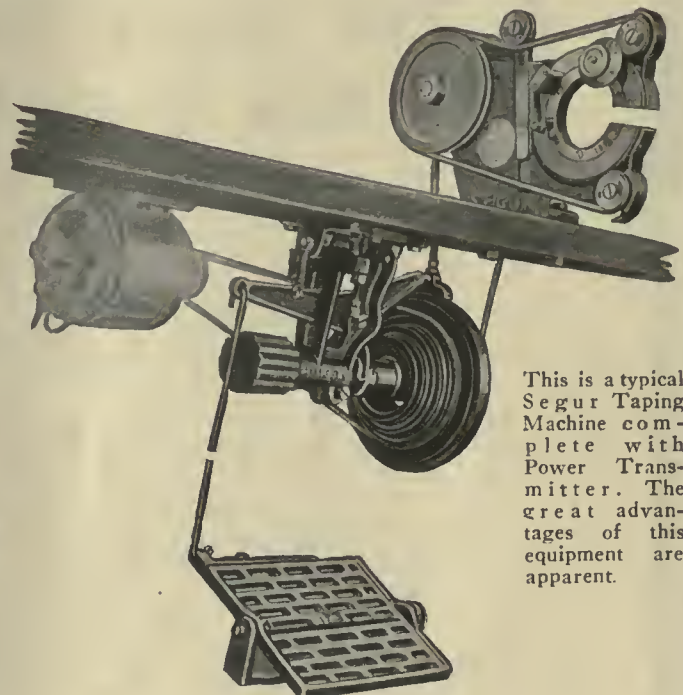
Write for Complete Set of Data Sheets



This Segur Hair-Pin Loop Coil Winder is shown attached to a standard Segur Lathe Head. This machine will wind coils of practically all standard lengths.



After the coils are wound they are Spread and Pulled into proper shape on this Segur Coil Spreader. With a few adjustments this machine is made to conform to the desired shape of coils. Coil is then pulled to finished form in one movement.



This is a typical Segur Taping Machine complete with Power Transmitter. The great advantages of this equipment are apparent.

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA

17th and Cambria Streets

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Branch Offices: Boston, Scranton, Pittsburgh

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto



*Broadway at Theatre Time, The Great White Way
from the Times Square District.*

The Great White Way that Put New York City on the Map

From all over the world, millions of people flock to New York City to see the "Great White Way," to be a part of it and actually to feel the flash and blaze of millions of glittering and scintillating white lights.

Like bugs around a brilliantly lighted lamp, millions are attracted to this "Great White Way" just as soon as the lights flash on. So persistently do they come that real estate is valued in tens of thousands of dollars per foot with little or none offered at any price.

Think of it. Here is a 300 ft. street (Broadway and Seventh Ave. combined) with a density of traffic so great at night that vehicles are permitted to run in one direction only. One of the widest streets in America, and yet a one way street. And all the result of a "Great White Way."

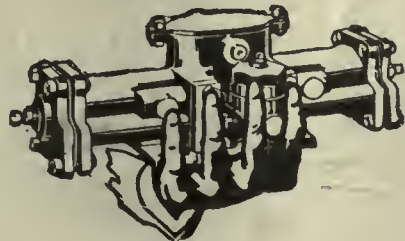
Think it over. You can put your city on the map with a real "White Way." Where Ornamental Combination Poles with Lamp Brackets are used—carrying also the span wires of the railway—as well as lighting wires—the cost may be divided between the railway company and the light company. Commercial interests find that it pays them good returns—they are willing to share in the cost of securing it—Go after them.

Get after your Chamber of Commerce—Don't let your city get into a rut. Ask us for details.

Electric Railway Equipment Company
Cincinnati, Ohio

30 Church St., New York City



*Modernize!**Pneumatize!*

To Be in Tune with the Times

No story better embodies the labor-saving bent of the American mind than Mark Twain's "A Connecticut Yankee in King Arthur's Court."

Wherever "The Boss" saw that a thing could be done better by machinery than by hand he ordered that change at once.

That is and always has been the typical spirit of America. It is not simply the spirit of the inventor, the manufacturer and the salesman, but the spirit of the men in the street and *of the man on the car*.

It is in that spirit of "never do by hand what you can do faster, safer and cheaper by power" that the operators of thousands of cars have installed and are continuing to install.

National Pneumatic

Door and Step Control

Motorman's Signal Lights

Door and Step Operating Mechanisms

Safety Interlocking Door Control

Multiple Unit Door Control

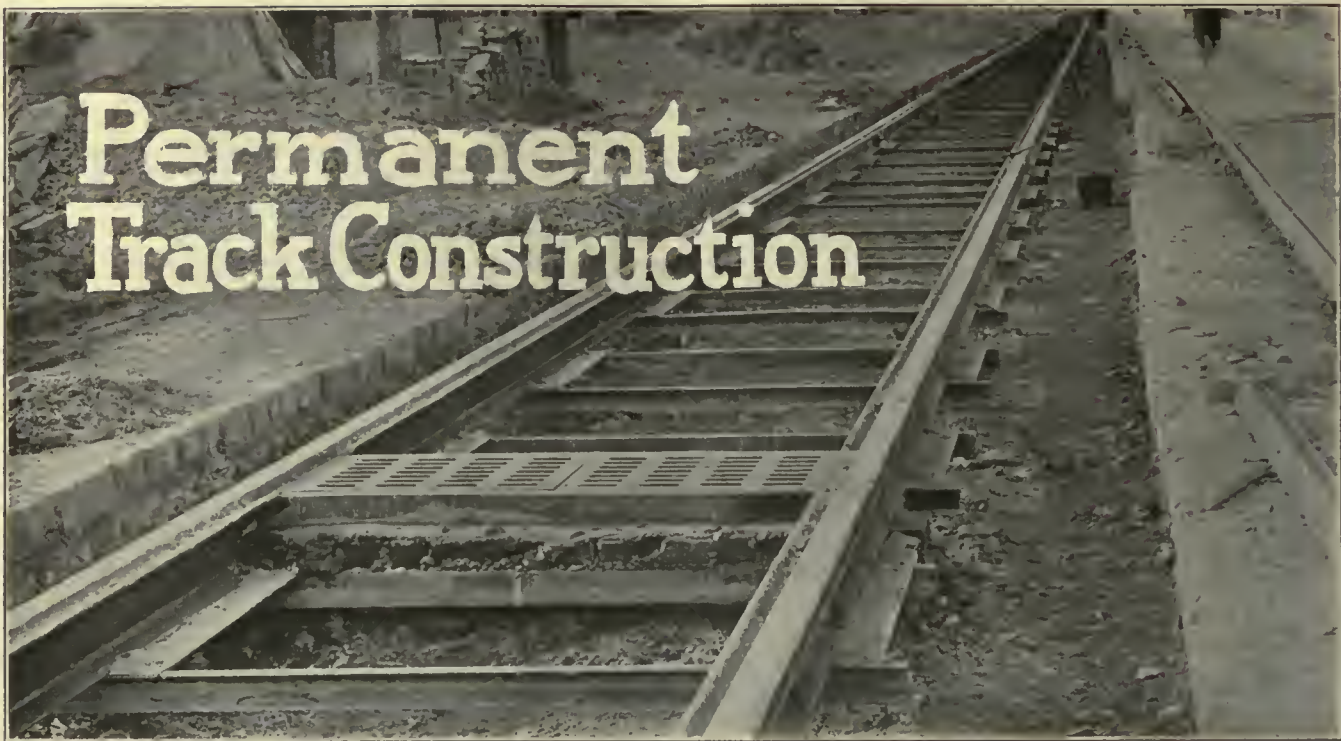
Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.

50 Church St., New York

Edison Bldg., Chicago

Works: Rahway, N. J.



New rails, steel ties, and every joint and tie welded by the RWB Dynamotor

When the Poughkeepsie & Wappingers Falls Railway laid new track recently they welded the joints and steel ties by means of the Lincoln Carbon Arc Process, using the RWB Dynamotor. Which is only another way of saying that they used the most efficient, rapid and economical methods of securing permanent track construction.



Fish Plate Welding

The Lincoln Carbon Arc Process costs less, last longer, has greater conductivity and makes permanent track construction.

Track Welding

Immediately after welding the joint, the RWB Dynamotor using the metallic arc builds up cupped rails, corrugated track, special work, etc.

Bonding

It takes approximately one minute to actually weld a life in bond to the rail. Now figure what your bonding crew can do.

Shop Welding

Gear cases, pinions, shafts, car wheels—in fact anything weldable is done by the same versatile dynamotor.

Rail Welding and Bonding Company

formerly The Lincoln Bonding Co.



Cleveland, Ohio.

New York Office
30 Church Street

Chicago, Office
343 So. Dearborn St.

London Representative:

Electrical Apparatus Export Corporation, 408-9 Bank Chambers—High Holborn

IRV-O-SLOT

Speeds Motor Repairs

Irv-O-Slot can now be furnished for every type of motor. Regardless of the thickness, dielectric strength, number of layers of paper or of cambric necessary, there is a kind of IRV-O-SLOT that will meet the most exacting requirements.

IRV-O-SLOT combinations are now solving the difficulties met by electrical superintendents, chief engineers and foremen of electrical shops.

IRV-O-SLOT consists of a layer of varnished cambric and a layer of fibrous paper solidly cemented together. Or it likewise may consist of two layers of fibrous paper with the varnished cambric in

between. Red rope paper, whalebone, fibre, raw-hide fibre, canvas and a hundred other combinations are available for the asking. It is made in thicknesses from 12 mils to 30 mils and is furnished in sheets, roll form or strips cut to specification.

Dielectric strength of Irvington Slot Insulation varies from 500 to 700 volts per mil, depending upon thickness.

Consistent use of IRV-O-SLOT saves time and cuts labor costs. Ask us for samples to suit your needs. Our Distributors will be pleased to furnish samples and prices.

Distributors

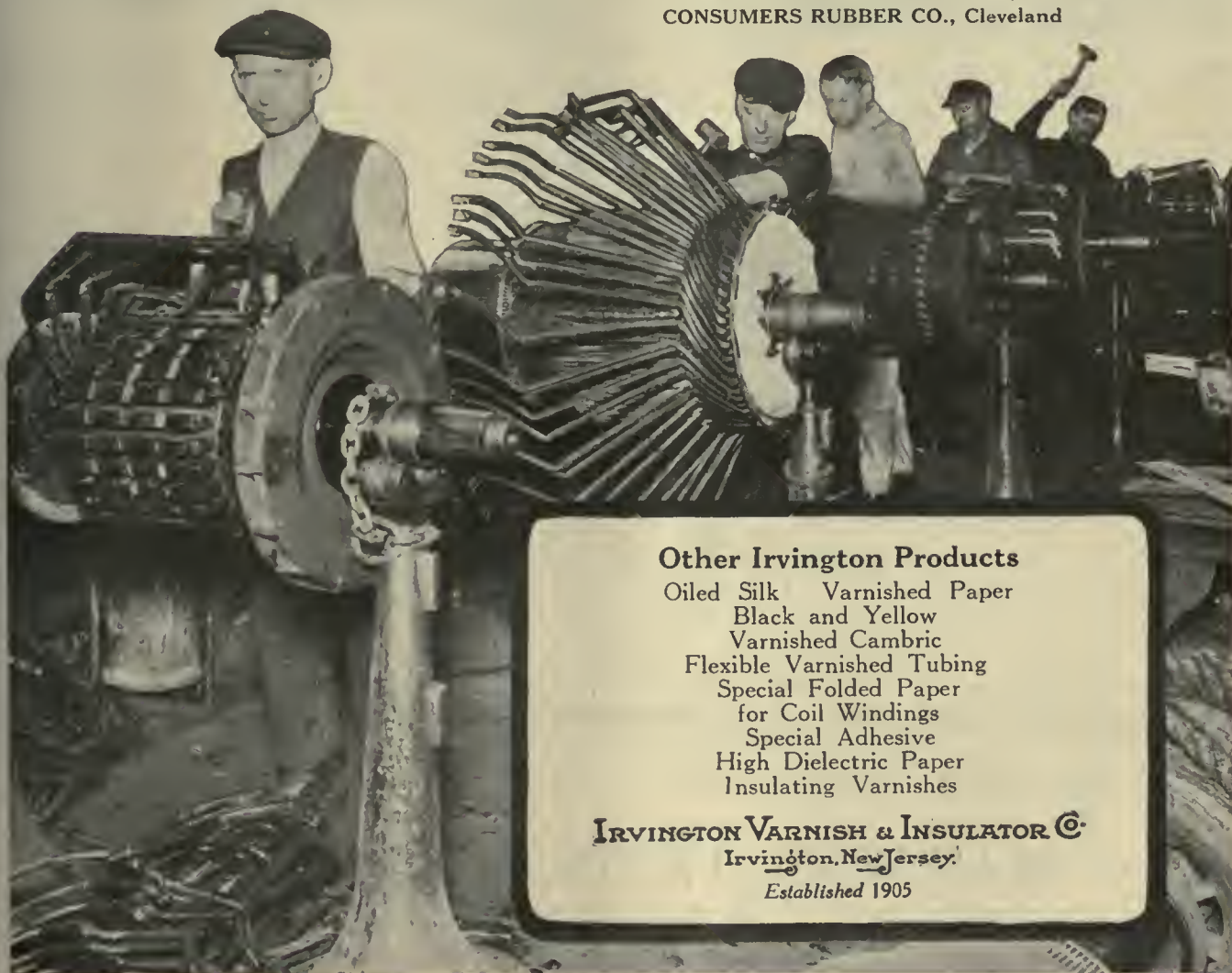
MITCHELL-RAND MFG. CO., New York City

L. L. FLEIG & CO., Chicago

ELECTRIC RAILWAY & MANUFACTURERS SUPPLY CO., San Francisco

T. C. WHITE ELECTRICAL SUPPLY CO., St. Louis

CONSUMERS RUBBER CO., Cleveland



Other Irvington Products

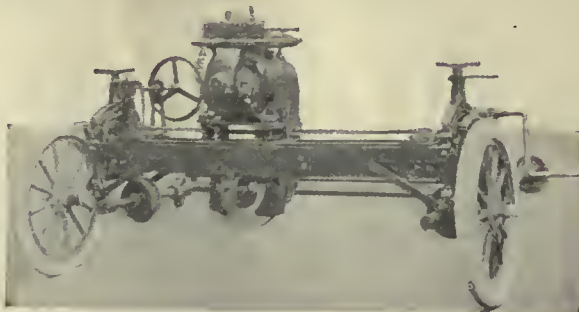
Oiled Silk Varnished Paper
Black and Yellow
Varnished Cambric
Flexible Varnished Tubing
Special Folded Paper
for Coil Windings
Special Adhesive
High Dielectric Paper
Insulating Varnishes

IRVINGTON VARNISH & INSULATOR CO.

Irvington, New Jersey

Established 1905

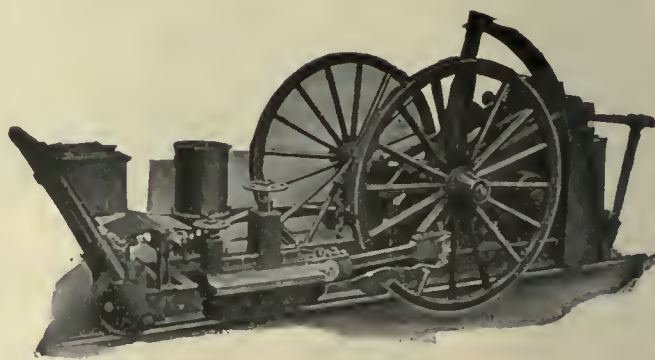
The High Cost of Inertia



The Universal Track Grinder has many features which facilitate and increase the accuracy of its work.



For getting into the grooves of girder rails, frogs, switches, etc., and for removing surplus metal used to fill up low or cupped joints the Atlas or the Universal Rail Grinder will produce excellent results.



The Reciprocating Grinder is especially adapted to grinding out corrugations, slightly cupped and new joints where a planetary grinding surface facilitates the work.

Just because a body in motion tends to keep moving and a body at rest tends to keep resting, the world pays and pays and pays.

You pay for it, of course, every time you start a car. And every time you stop one. There is a human inertia that is just as much—and costs even more. Doing nothing when something urgently requires doing, frequently costs most of all.

For example, there is the well-known fact that corrugated rails, cupped joints and battered special work entail a constant loss. Nobody doubts that these conditions result in tremendous loss through the progressive deterioration of track foundations and rolling stock. Nor does any engineer fail to realize that this condition grows worse at rapidly accelerating rate. Doing nothing to remedy the conditions costs more than applying the remedy. Somebody's tendency to remain in a state of rest make the road pay and pay and pay. Human inertia is a tremendously wasteful quality.

It is far, far cheaper to apply the remedy for worn track than to do nothing. Grinding out corrugations, welding bad joints and special work and grinding off the built-up material are such inexpensive processes. Any road can afford to rejuvenate its bad rail. no road can afford to operate on it.

Here are your grinders—used in every state of the Union and in—Foreign Countries.

A word from you buys you the details.

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia

Money saving invariably follows the use of Tulc

Lubricating service can be classed as individual only when each property to which it is applied is considered as an individual unit, requiring a lubricant and lubricating methods different from those used on all other properties.

It is not safe to assume that what is beneficial on one road will be beneficial on another, even tho the physical characteristics of both are apparently the same. There are innumerable examples which show how this method of procedure has often resulted in an actual lowering of operating efficiency.

The lubricating service offered by the manufacturer of Tulc is individual in every sense of the word. When we are called upon to improve lubricating methods and decrease lubricating costs on a certain property our calculations are based on the requirements of the property under consideration—not upon what we have done in the past. Our broad experience in this field and the valuable data which we have acquired in solving similar problems for other roads is helpful, of course, but only insofar as it can be applied in a general way. We have no fixed policies which must be rigidly adhered to. Our service is flexible. That's why it's *individual* and why it can be applied to so many dissimilar properties with consistent, money saving results.

We are in a position to offer this service to a few more properties and will be glad to hear from executives to whom it will be helpful.

"OVERALL SPECIALISTS"

The service men who work with you on your lubricating problems are not "experts on theories." They put on overalls and get right down to brass tacks—pack your cars—*show* you how and why Tulc should be used. They get results—real money saving results—99 times out of a hundred. The hundredth time there is no charge for the service.

The Universal Lubricating Co.

Offices: Schofield Bldg.

Works: Sweeney Ave.

Cleveland, Ohio



—scientifically and
accurately compounded to
reduce lubricating costs

Not Idle Claims But Cold Facts



Thermit

The following advantages of the Thermit Insert Weld over any other method of joining rails are not mere idle claims, but have been amply proved wherever the welds have been installed:

- | | |
|--|---|
| <p>1 They do not cup.</p> <p>2 Breakage is so small that it can hardly be computed in percentages.</p> | <p>3 They not only last as long as the rail, but due to absence of cupping, make the rails last longer.</p> <p>4 They absolutely eliminate maintenance during the life of the rail.</p> |
|--|---|

Let us know the section number of the rail which you wish to weld so that we can ship Thermit welding material suitable for the purpose. On receipt of an order for material and apparatus, we will send an expert demonstrator to instruct your men so that you can carry on this work yourselves.



Send for our latest Rail Welding Pamphlet No. 3932.

METAL & THERMIT CORPORATION

Boston
Pittsburgh
Chicago

120 Broadway



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Toronto
San Francisco



Going a Step Further

Fifty years of specialization in one particular branch of the oil business — *railway lubrication*, has developed Galena Oils to a state of perfection that they are recognized everywhere as the highest grade railway oils possible to manufacture.

But it is not the policy of this company to rest content with the creation of *better lubrication*, hence the development of *better lubrication service*, as exemplified in the master organization of specialists known as the Galena Mechanical Expert Department.

The co-operation offered through the medium of this exclusively Galena Service is daily proving its value on hundreds of railways, by invariably securing results in efficient and economical lubrication that show quickly in improved operation.

Just as the efforts of duplicating Galena Oils have failed through lack of *quality*, so likewise have the attempts to copy Galena Service been made ridiculous by absence of the vital essentials of knowledge and experience.

*When Galena Service Goes In
Lubrication Troubles Go Out!*

THE GALENA-SIGNAL OIL CO.

NEW YORK

FRANKLIN, PA.

CHICAGO

Offices in all principal American Cities

LONDON

BUENOS AIRES

PARIS

GALENA
SERVICEGALENA
SERVICE

The problem of the congested Surface Railway is to make every foot of track in the traffic gathering area work to its full capacity.



Multiple-Unit Control to Increase Track Capacity

It was Sprague Multiple-Unit Control that made train operation possible, practicable and successful. It banished the steam locomotive from the elevated railways and made possible longer trains, shorter headways and higher speeds for the underground railways. The final result was the electrification of the heavy rapid transit suburban lines of such great trunk systems as the New York Central and Hudson River Railroad.

But these applications to right of way electric service did not exhaust the possibilities of G-E Multiple Unit-Control. The need to route an increasing number of cars over a street track of unchangeable length brought a new field and new problems.

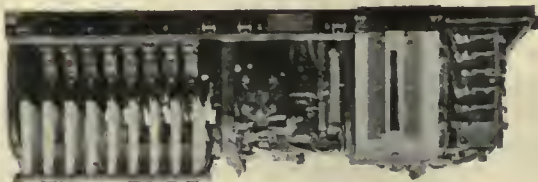
The adaptation of PC-5 control to three-car surface trains in Boston is typical of the possibilities of Multiple-Unit Control in raising track capacity. The increase has been secured despite the reduction in the number of transportation units from thirty to fifteen an hour.



C-129. Master Controller.
Light in Weight and Re-
quiring Minimum Plat-
form Space.



PC-5. Motor Controller Complete.



PC-5. Motor with Cover Off—Arc Chute Swung Down—
Showing Accessibility for Repairs and Inspection.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 57

New York, Saturday, June 4, 1921

Number 23

More Business in Government, Less Government in Business

THIS idea, which was adopted as a text by the United States Chamber of Commerce at its meeting last month, seems also to be the guiding policy of the present national administration. A desire to secure help from industry in the work it has to do and to undertake by government action nothing which can be carried on more effectively by private initiative has already been expressed by the Secretary of Commerce. Another significant declaration bearing upon the same matter was contained in addresses made at a banquet in New York last week in honor of the founding of the *New York Commercial*, attended by the President and the Secretaries of War, Commerce and the Interior. The occasion, the 125th anniversary of the founding of an important business paper, was an appropriate one in which to outline the essential correlation between business prosperity and national prosperity. This thought was voiced by the President, who held that the business man should not be prejudged as a criminal, but recognized as an important factor in national prosperity. The close connection of the business press with industry was also recognized in the address of the President, as well as in that of Mr. Hoover. This position on the part of the national government is most encouraging, especially at the present time when there is so much unemployment and stagnation in business. With such a sentiment, there should be a revival of industry.

Get the Young Engineer While the Getting Is Good

ELSEWHERE in this issue is a graphic portrayal of the value of a capable man in charge of rolling stock. If similar data for other departments of a railway could be portrayed as graphically, the results would doubtless be just as striking. Such men are of inestimable worth to a company, and more young men of the necessary ability should be in training as future master mechanics, superintendents of equipment, transportation engineers, power or track engineers, superintendents and general managers.

This month the engineering schools of the country send forth a large number of potential civil, electrical and mechanical engineers—young men with good fundamental training and most of them with plenty of ambition and energy. Some of these future leaders should be encouraged to come to the electric railways, where every one knows they can find plenty to do. The trouble is—the reason they do not come is—first, that no one goes after them: there is no organized and very little individual effort to induce young men to come to electric railways, and, second, that when they do come it is in only a few cases that the railway actually makes it worth while, opens up the right opportunities to them.

Not that they should start at the top! By all means the opposite should be the case. But the opportunities

ahead should be made clear and the positions which they may ultimately attain made sufficiently attractive as to financial status and responsibility.

The continued development of organized methods to absorb young engineers into other engineering industries should be sufficient indication of the value of such effort. The electric railway has been slow in this line. But the present is a good time to change. There is a new crop of young engineers. Some of the industries which usually absorb many from the annual production are operating on a restricted basis and will not take the usual number this year. Electric railways can normally use more men in summer time. Why not make a study to see where young engineers could be used to advantage and get them now that the getting is good?

Jitneys Regulated in Their Last Strongholds

LOCAL legislation in Kansas City, Mo., and state legislation in New Jersey and Connecticut give prospect of doing much to bring jitney competition within reasonable bounds in these places. The quarrel of the railways with the jitneys has never been with these vehicles as such, but with them on the score of their unreasoning and unreasonable competition on anything like a comparable basis. The jitneys have continued in use in the places mentioned long after similar vehicles were banished elsewhere, from a combination of circumstances, but mostly because of political chicanery. In Kansas City they have now been relegated to operation on streets where there are no railways, while in both New Jersey and Connecticut prospective operators of the jitneys must obtain from the local state commission a certificate of convenience and necessity before being permitted to operate. In neither of the states mentioned has the new law yet begun to function, so no precedents have been established as to the attitude of the local bodies with respect to regulation, but the commissions have set to work to organize the machinery therefor. In Connecticut, for instance, the commission has called upon the local governing authorities to indicate routes for the jitneys, thus preserving a measure of home rule.

In Kansas City the lessons of the benefits of the new legislation are fast being driven home. The receivers of the Kansas City Railways, true to their promise, have placed about 10 per cent more cars in operation. This service would have been provided before except that under jitney competition there was not enough traffic to pay for keeping the cars on the streets. These additional cars have had a salutary effect, with the result that in the month of operation under the ordinance the public view has changed to a marked extent. The bitter enders will of course stick to the jitney to the end. That is their prerogative. But the real place of the jitney as a service supplementary to the trolley instead of being competitive with it appears now to have been firmly established in the public mind in Kansas City.

From "Interurban" to "Electric Railroad"

REFERENCE is often made to the name "interurban" as being an onus—a word too easily made over in common parlance into "inter-ruben" and carrying a meaning not altogether complimentary. Some have suggested that an effort be made to rename the interurbans "electric railroads," on the supposition that this would lift them to a higher plane of public esteem. This may help, but cannot alone do the trick, for an interurban by any other name would still be subject to criticism—if criticism was deserved. But there is one way in which the desired end may be attained, and that is by such improvements in cars, roadbed and service as will earn for the property the reputation of being a real railroad.

An evolution of this kind has been witnessed on the Chicago-Milwaukee line operated by Britton I. Budd, whose effort has been persistently directed toward making the service of this road comparable with the high-grade steam road service with which he competes. He has very nearly attained that goal, with the result that the traffic handled has increased enormously, and the remark is now frequently heard, "It's a real railroad." The word "interurban" doesn't seem to apply any more. At one time, like many other electric lines, it was better characterized as an extended street car line, but it has won the more desired term of railroad because it is one. A similar evolution is now well under way on the Indianapolis-Louisville line under the direction of Harry Reid, and the policy being pursued promises to bring much new business and win for it the favorable public attitude sought. Some of the improvements made and in the making on this line are reviewed elsewhere in this issue. Without such actual physical evolution in an interurban property there can be little accomplished by an effort merely to change the term of reference.

Repair Versus Replacement in the Rolling Stock Department

ONE effect of the erstwhile "hard-up" condition of the electric railways has been a campaign of rolling stock rehabilitation. Superannuated bodies and trucks have been scrutinized to determine whether a year or two more of service could be squeezed from them. Cars which were awaiting only financial amortization before destruction have been refurbished up and re-commissioned. In ordinary times the economy of much of this work would be questionable. In the hard times which have recently been passed through economics gave way for the time to bitter necessity. This was marking time, as was pointed out editorially in the May 21 issue of this paper, but marking time has its place in transportation as well as military practice provided it is not continued too long. Marking time produces no speed toward progress, it simply keeps the army in step, or, in electrical phraseology, in synchronism.

There will always be an excuse or a reason for re-vamping some rolling stock, particularly to adapt it to changed transportation requirements. But the wholesale continuation of this practice will soon cease. In other words the era of repair will give place to the era of replacement. The former has, however, brought out clearly the excellent qualities of much of the work of the builders of many years ago. Thus, in last week's issue was an article telling of work done by the New

York State Railways on some motor cars and trailers. The cars of one batch were originally open bench summer cars. These were made over into closed motor cars some years ago and have now been remade over into center-entrance trailers. The fact that they would stand all of this, even allowing for the reinforcing which necessarily accompanied the remodeling, shows that they originally had good stuff in them, well fabricated and finished.

Fare Changes and Conductors' Morale

CONDITIONS on a certain railway which will be unnamed prove again that when a change in fare becomes necessary, failure to adopt a system that commends itself as just to the average layman is as bad for platform morale as it is for public relations. On this particular property the change in fare was an increase and the line was divided into equal-length fare zones, while the line itself operates in and between several practically contiguous cities. To cross the dividing line means the payment of a second fare whether the passenger boards the car $\frac{1}{2}$ mile or 3 miles back or whether he is riding another fraction of a mile or several miles more. To make the matter worse several of the zone limits occur at points where there is naturally considerable short distance riding from one side to the other of the selected zone line. The obvious result has been the dissatisfaction of a great many riders who are expected to pay double fare for a distance that may be less than many people obtain for a single fare. Of course, the grumblers vent their grievances on the company representative nearest at hand—the unhappy conductor. Day in and day out he is greeted with such ire-provoking expressions as: "What kind of a railway is this, anyway?" "Why didn't you yell out that it meant another fare to ride another block?" and so on to the point of fisticuffs.

Such conditions as this mean something more than loss of traffic. They are sure disrupters of the conductor's morale and of his confidence in the management. Neither efficient fare collection nor enthusiastic ride selling is to be expected when the company has adopted—or some commission has compelled it to adopt—what looks like the easiest way of devising a multi-fare system. Would it not have been better to have a system of zones that would seem a little more logical to the car rider, i.e., with zone points at natural traffic division points? It is not necessary that the zones should be of equal length provided the average rates per mile do not differ greatly and the total fare for the entire ride is reasonable. Such a plan would permit the zone limits to be placed at points where the greatest number of car riders would not be asked to pay an extra 6 cents or 10 cents for a ride of a few blocks and would largely do away with any considerable agitation for overlaps or lower fares.

On the selection of its zone points a company can usually get good advice from its conductors. They are the ones brought into closest contact with the company's customers, and they know the way in which any fare plan is likely to be regarded by those who pay fares. In fact it is a good rule in any kind of business that a merchant must convince his salesmen that the goods they have to sell are worth the price and that the sales conditions are fair before he can be very successful in bringing the customer to this belief. This rule should apply in electric railroading.

**Blighted Districts
and City Planning**

AMONG the interesting features of the report made by the St. Louis Planning Commission on a transit system—present and future—for that city is the discussion on blighted districts, or those areas of low assessed values which exist in most cities between the business district and the more popular residential districts. From many standpoints it would seem most desirable if the blight on these districts could be removed. To the municipality they mean sections of the city from which the tax yield must be low; to the electric railway they mean the operation through them of relatively unprofitable car-miles to carry the passengers to and from the outer districts, while to the property owner these deteriorated districts obviously represent a direct monetary loss. With regard to such areas in St. Louis, Harland Bartholomew, engineer of the commission, says.

“Hauls of 5 or 6 miles are not the exception but more nearly the rule. Even the haul would not be so objectionable were it not for the fact that nearly half of it is through sections of the city which have constantly deteriorated in usefulness and from the standpoint of transit are almost entirely unremunerative.”

To some people the cause of the blight which has fallen upon these ill-fated districts, lying between the business and high-class residential sections of the city, is the unit fare. If a lower fare were charged for the shorter ride to them as compared with a higher fare for the longer ride to the outer and more favored regions, they say, the salvation of these districts would be secure. The owners of the buildings then would be encouraged to tear down their old-fashioned houses and erect better structures in their place to accommodate the tenants to whom a difference of a few cents in fare per ride would be an object.

It is not well to dogmatize about such matters from appearances, but the blighting of a city district has so many possible causes that it is usually unwise to say that it is due to any single factor or that in any particular case it could be corrected by such a simple plan. It is more probable that even with a zone system the same conditions would prevail to very much the same extent and that the causes lie deeper than simply the rate of fare.

In fact, in the usual rapidly developing American city there are almost bound to be certain areas surrounding the business district which are changing in character from residential to commercial. Usually the history of these districts, or a good part of them, is about as follows: At one time they constituted a first-class residential neighborhood on the fringe of the city as it then existed. As the commercial area expanded, trade gradually pushed its insidious way in among the mansions. First perhaps came the dentist, then the apothecary's or milliner's shop was opened, to be followed by the high-grade grocery store. Gradually the more

exclusive or prosperous residents moved outward and the former mansions became boarding houses, then possibly tenements. In all of these cases the trolley fare was probably not the controlling factor. The ultimate hope of such a district is not that its high-grade residential character will be revived—that is probably hopeless—but that it relatively will come nearer the business district and finally become part of it. Then the old buildings will give place to modern office structures, stores or warehouses, the assessable value will again increase and the owner will be happy.

The only effects which the development of electric railways and rapid transit systems can have on this natural condition are to hasten the change and to direct it along certain routes. This hastening may be first in the retrograde character mentioned and then in the renaissance of the property as regards value. In Brooklyn, for example, Fourth Avenue has already been improved in many spots because of the building of the subway. In fact, both offices and stores will be apt to follow along a rapid transit line, like a vine, leaving between the arteries of trade triangular areas of a residential character. Neither the owners nor the city should worry unduly about these fluctuations in real estate value. The “blighted” period is very apt to form the chrysalis stage of development, to which city real estate is subject.

**Electric Railway Engineers
Constitute a Large Fraternity**

COMMITTEE activity in the American Electric Railway Engineering Association is now at its height. The meetings are being well attended and a fine spirit is manifest. One of the most impressive signs of efficiency in this committee work is the spirit of good fellowship that marks all of the gatherings of committeemen. This fact impresses one with the value of such meetings from the human standpoint, which in itself would justify the time and expense involved in getting together.

For the benefit of the technical development of electric railway work it is necessary that the responsible engineers be furnished ample opportunity to meet at these committee sessions and at the conventions of the Engineering Association, otherwise they are apt to be provincial and academic. The large attendance at committee meetings shows that this truism is appreciated. The

*Quotation from the
Federal Electric Railways
Commission Report*

No. 23

GENERALLY speaking, this (introduction of economics of operation) can be done by the elimination of deadheads and other free service, the abandonment of non-profitable lines and, where practicable, the substitution of one-man cars for heavier equipment, the modification of special taxes or provisions for paving, snow removal, street closing, tolls, contributions toward the cost of public highways, bridges, etc., reduction of such rentals and power rates as may on investigation prove excessive, the co-operation with the public in developing faster schedules and installing skip stops at convenient places, rerouting of cars, the use of trail cars, keeping street car tracks clear of traffic and other congestion, due to parking of motor cars on curbs, and the regulation of vehicular traffic.

helpful personal relations which are established thus are maintained between them by correspondence, chance or planned visits, the reading of “personal” items in the electric railway press, etc. There has thus been built up in the electric railway industry a national, although informal, engineering fraternity, membership in which should be highly prized. Every such opportunity should be embraced to foster the spirit of brotherhood that the electric railway engineer is privileged to enjoy.



High-speed train of Indianapolis-Louisville interurban line. Note the novel bell on front of motor car used in addition to whistle.

Developing an Electric Railroad

Indianapolis-Louisville Interurban Is Undergoing Extensive Rehabilitation and Improvement—Features of New Steel Motor Cars and Rebuilt Trailers for Use in High-Speed Limited Service Are Described—Other Improvements to Be Related in Articles to Follow

NOTWITHSTANDING high prices and other adverse economic conditions, the Interstate Public Service Company, Indianapolis, Ind., under the direction of Harry Reid, president, has been extensively improving its 117-mile Indianapolis-Louisville interurban property and service during the past two years. The betterment work has followed along a plan designed to develop a railroad capable of rendering a high character of passenger and freight service between these two important terminal cities. While all details of the plan have not yet been fully realized, the physical improvements already accomplished, coupled with the evident disposition of the operating officials to give the public the kind of service it wants, have had a marked effect in attracting patronage to the road. This is reflected in the accompanying tables showing the recent growth in freight and passenger traffic.

The major betterments already carried out include the purchase of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company and the merger of them with the Interstate company; the purchase of new motor

cars, the building of trailers and the inauguration of a new faster through limited service between Indianapolis and Louisville; the purchase of locomotives and new freight box cars and the inauguration of new through over-night freight service; the change-over of the 62-mile mid-section of the road from 1,200 volts to 600 volts to conform to the remainder of the system; abandonment of old 25-cycle transforming equipment and the installation of new 60-cycle substation equipment; the reconstruction of the old transmission line for higher voltage, the building of 54 miles of new transmission line and the dismantling of two obsolete power houses with arrangements for purchase of power, and a large amount of work on overhead and distribution systems and on the track and roadbed. Among the further improvements planned for the immediate future are the building of new shops, on which work has recently begun; the probable purchase of necessary equipment and inauguration of a parlor car and dining car service with possible sleeping car service; the installation of further automatic substation equipment, etc.

Perhaps of greatest interest at the moment are the

PASSENGER EARNINGS, INTERSTATE PUBLIC SERVICE COMPANY AND INDIANAPOLIS & LOUISVILLE TRACTION RAILWAY

	1919	1920	1921
January.....	\$89,585.70	\$116,207.21	\$131,814.43
February.....	84,807.51	111,489.29	119,405.38
March.....	95,465.18	124,092.35	136,289.42
April.....	94,785.72	127,294.56	
May.....	104,089.51	134,507.01	
June.....	101,370.90	128,922.31	
July.....	116,066.87	141,092.27	
August.....	136,278.37	149,082.99	
September.....	130,318.67	146,569.34	
October.....	125,267.12	139,529.14	
November.....	120,003.21	132,008.51	
December.....	121,362.82	138,512.29	

The operation of the Indianapolis & Louisville Traction Railway was taken over by the Interstate company in July, 1919. These figures include the entire line, Indianapolis to Louisville, Ky.

FREIGHT EARNINGS, INTERSTATE PUBLIC SERVICE COMPANY AND INDIANAPOLIS & LOUISVILLE TRACTION RAILWAY

	1919	1920	1921
January.....	\$7,029.47	\$13,349.00	\$14,378.70
February.....	7,406.60	15,617.19	16,146.92
March.....	9,235.31	20,362.71	21,024.46
April.....		22,275.37	
May.....	10,203.83	23,127.48	
June.....	12,159.24	28,886.62	
July.....	12,428.94	23,949.87	
August.....	17,031.42	21,571.49	
September.....	19,088.46	27,598.62	
October.....	17,666.28	24,800.50	
November.....	14,741.09	20,556.98	
December.....	12,395.49	16,085.10	

The operation of the Indianapolis & Louisville Traction Railway was taken over by the Interstate company in July, 1919. These figures include the entire line, Indianapolis to Louisville, Ky.

new rolling stock and the plans of the equipment department for a new shop at Scottsburg, Ind. In the last two years the rolling stock purchases have included twenty new box cars, a 37½-ton and a 25-ton locomotive and eight new steel passenger cars. Because of the great amount of time and design talent applied, these passenger cars are of particular interest. They are quite fully pictured in the accompanying views.

In general, these cars are of steel construction with a composite superstructure and monitor deck roof, with the interior arranged in passenger, smoker and baggage compartments. They are 62 ft. long over bumpers, seat sixty passengers and weigh 95,500 lb. They are equipped with special Baldwin trucks, having 7-ft. wheelbases and placed at 39-ft. centers. These trucks are equipped with 36-in. rolled steel wheels and 5-in. x 9-in. journals and Stucki self-centering and positive-rolling side bearings. The body side bearing is made with a removable wearing plate. The spring design on the trucks is such as to preserve good riding

from the two side sills and two center sills. The side sills consist of 5-in. 6½-lb. channels extending from the buffer beam at the front end to the corner post at the rear end. The center sills consist of two 7-in. 15-lb. I-beams extending from front to rear buffer and reinforced with continuous pressed-steel section ¾ in. thick extending from back of the bolsters to near the ends. Certain features of the underframe and vestibule steel work provide an anti-telescoping construction. The bolsters are of the built-up type consisting of plates and rolled sections which are fastened to the center and side sills.

The floor beams consist of 5-in. 6½-lb. channels extending from side sill to side sill and riveted to the horizontal flange of the side sills and to the side posts. The end sills consist of 6-in. 8-lb. channels supplied with 12-in. x ¼-in. top and bottom cover plates extending from side sill to side sill. No diagonal bracing was provided in the underframe, except for those braces in the platform construction which extend from each



THESE VIEWS ARE OF THE INTERIOR OF THE MOTOR CAR

No. 1—Motorman's cab partition showing open construction and heater location.

No. 2—Looking forward from rear of main passenger compartment showing interior finish—aisle mats not in place.

No. 3—Rear of baggage compartment showing folding seats, city fare register location, etc.

No. 4—Convenient mounting of instruments and controls in operating cab.

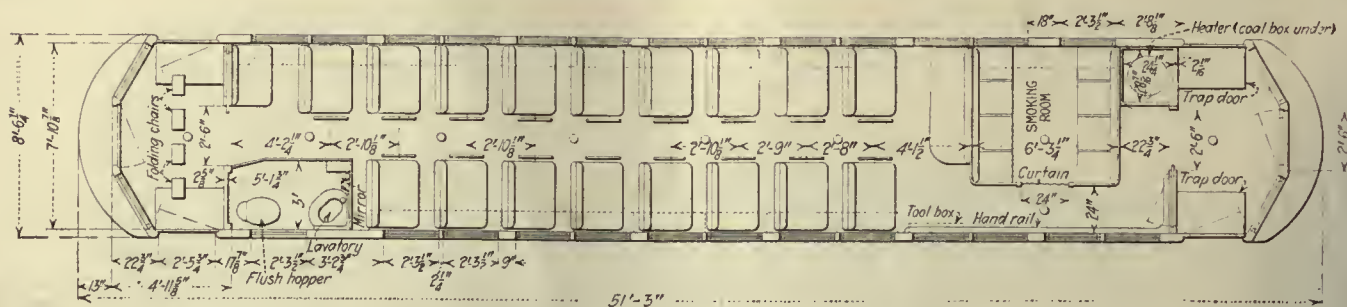
qualities through a wide range of live load. This is obtained by the use of an auxiliary set of bolster springs which do not come into bearing until the load has exceeded a certain amount, a feature developed for the last cars bought by the Chicago, North Shore & Milwaukee Railroad. Adequate spring support for a heavy load is thus secured without making the car ride stiff under light load conditions.

The further major equipment of these cars comprises four G.E.-254, 150-hp. motors with automatic field tap control and General Electric type PC multiple-unit control arranged for single-end operation. Westinghouse 38-ft. type D-3-EG compressor and type J governor are used. The couplers are of the Tomlinson MCB radial type, conforming with the C.E.R.A. standard.

The main support of the steel underframe is derived

corner of the platform to the near center sill. The entire underframe is covered over with steel plates which tie all the members together, giving a certain amount of diagonal bracing and serving to fireproof the floor from the equipment. The buffers were made from 10-in. 15-lb. channels applied with the flanges outward and bent so that the radius of the outside flange is 5 ft. A 5½-in. Rico heavy-weight anti-climber section extending the full width of the car was secured to the web of these buffer-beam channels.

The side sheets, consisting of No. 12 gage steel and extending from the bottom of the side sills to the belt rail, with No. 14 gage steel above, are riveted to sill, belt rail and posts. This side-sheet construction is strengthened by a 4-in. x ½-in. bar riveted to the side sheet and extending from one end of the car to the other to form the belt rail. There is also the further



FLOOR PLAN OF NEW INTERSTATE PASSENGER CARS

strengthening afforded by a 3-in. x 3-in. x 1/4-in. angle extending from end to end of the car body.

The side posts are made up of 3-in. x 2-in. x 1/4-in. Tees sandwiched in between two sections of oak posts and covered with two pressed steel sections and a cover plate riveted over the joint, giving the appearance of a metal post. Each post is welded to the belt rail and side sill. Every third carline is of T-iron and wood composite construction, while the two intervening carlines are of wood.

The interior of the car is finished in cherry, stained mahogany, and the Agasote head lining is painted white, giving a pleasing and bright interior appearance. Center lighting is supplied by two circuits of 94-watt lamps. The fabrikoid covered seats were furnished by Heywood Brothers & Wakefield Company, New York. The bell cord is carried through the center of the car in anti-swinging hangers.

MONITOR DECK ROOF DESIGN USED

After a study on the part of H. H. Buckman, master mechanic, the monitor-deck type of roof construction was decided upon because of the superior ventilating properties claimed for it. Ventilation is afforded by twelve deck-sash automatic ventilators supplied by the Automatic Ventilator Company and located two in the baggage compartment, four in the smoking compartment, five in the main passenger compartment and one in the toilet.

The rear vestibule is arranged with a door on either side and equipped with trapdoors so that the vestibule

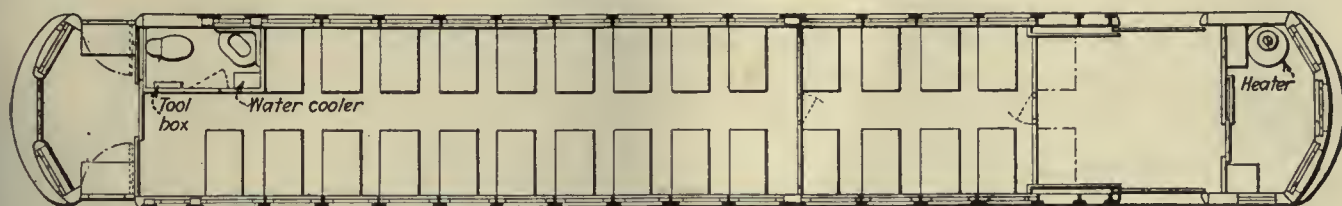
may be closed up tight. The platform is reached by mounting four steps of heights from rail to car floor of 16 in., 12 in., 12 in. and 12 in. The rear vestibule is also equipped with a train door, as it is the plan to use these new cars in limited service and haul trailers. No train door is provided at the front end, however.

The toilet is located just inside the rear vestibule and is equipped with a water-flushing bowl, wash basin, mirror, etc. The tool box is mounted on the inner partition and the water cooler is inset in the forward corner of the toilet. A 25-gal. tank for carrying the flushing and washing water supply is located overhead in the toilet room and is filled from either side of the car by attaching an ordinary garden hose to the pipe leading from the tank to that side of the car and fitted with the male end of a standard garden-hose connection. When the tank is filled through one of these pipes, the other acts as an overflow, and as these two pipes enter the tank at the top, no valve is necessary in either.

Through the use of the Peter Smith hot-water heater in the motorman's cab the full capacity of the baggage compartment is available for handling baggage and express shipments. Two folding sheets attached to the partition between the baggage compartment and the smoking compartment are available for use of passengers when the car is heavily loaded and there is room in the former. The motorman's cab is separated from the baggage compartment by a partition made of pressed steel sections with wood fillers, designed to protect the motorman from being crushed by the heavy



NEW HIGH-SPEED 62-FT. STEEL PASSENGER CAR OF THE INTERSTATE PUBLIC SERVICE COMPANY, INDIANAPOLIS, IND.



FLOOR PLAN OF INTERSTATE TRAILER USED ON LIMITED TRAINS

baggage coming forward in case of collision. This partition was built with $1\frac{1}{4}$ -in. openings between the pressed-steel sections in order to let out the radiated heat from the stove and thus prevent the motorman's cab from being uncomfortably warm. The first three openings adjacent to the door, however, were covered with a plate to prevent any one from getting his fingers jammed when the sliding door is opened. An accompanying picture shows the construction of this partition and also the provision made for carrying the train signal lamps and flags.

The arrangement of the motorman's cab is particularly interesting. The controller and brake valve are located for convenient operation from a sitting posture on a built-up seat adjacent to the window at the right side of the cab. Between the door and air valve is an instrument board on which is mounted an ammeter, the air gage and between these an order clip or holder, a snap-switch controlling the headlight, a push button for signaling the conductor as a check upon orders when approaching each siding, and a push-button switch connected with a small light which illuminates the train order when in place on the board. Just above the board are two small levers operating air valves, one of which operates the sander and the other a locomotive bell. The whistle valve is located overhead in the front corner of the cab and a cord from it hangs down at a convenient point for the motorman. Both the bell and sander valves are of the Viloco throttle type. The hand brake staff is located in front of the control mechanism and given an upper support and bearing on the triangular steel frame attached to the dash and supporting the control board and other mechanism. This hand brake is equipped with a large wheel and arranged for 100 per cent braking. A Drew mirror was installed on each front corner post wherein, from a sitting position, the motorman can look through the side cab windows into the mirror and watch the rear end. The Interstate motormen have found the two mirrors to be very helpful as a means of watching to see if the rear trucks split switches when negotiating city track special work, in addition to the usual use for observing passenger movements. By watching in the left or right mirror, depending on which way the rear trucks would go if the switch were split, the motorman will note immediately any sudden swing of the body or see the corner of the truck swing out and stop the car in time to avoid damage.

Located on the inside of the motorman's cab partition is the switch cabinet for controlling various car circuits. The telephone used in communicating with the dispatcher from points along the line is mounted on this same partition beside the switch cabinet, and a small writing desk on which to write orders is located just below the cabinet. There is also a rack on which extra jumpers, air hose, coupling

pins, sleet cutter, shackle bar, etc., are carried. A light was installed in the switch cabinet and a hole cut in the top and bottom. The bottom hole permits light to shine on the desk where orders are written, and the upper hole on the heater gage. A $\frac{1}{2}$ -in. thick rubber mat is provided on which the trainmen can stand when using the telephone as protection against static shock.

LOCOMOTIVE BELL AN EXCELLENT ADVERTISEMENT

One of the unique features of these cars is their equipment with an air-operated locomotive bell to serve as a warning alarm in addition to the whistle and foot bell. It is a No. 602 Baldwin Locomotive bell which has a tone somewhat higher than commonly used on steam roads. The sound of this bell is claimed to carry better than the whistle, particularly under fog and high wind conditions. It is used at particularly bad crossings and while passing through the smaller towns, or anywhere that it is desirable to sound a warning continuously or repeatedly. The motormen are instructed to use the whistle as they have always done and to use the bell for an additional alarm. One consideration in this connection was that it is considerably cheaper to operate the bell than it is to blow the whistle repeatedly. The bell consumes 0.7 cu.ft. of air per minute while the whistle consumes 40 cu.ft. per minute. The officials of the railroad have also found that the novelty of the bell has been an excellent advertisement for the cars of the Interstate company. Furthermore, the traffic police of Indianapolis have encouraged the motormen to sound this bell at the main intersections where they are stationed, as it is very effective in helping them clear the streets.

Particular pride is taken by the designer and builder of these cars in the distribution of the various equip-



REAR OF STEEL MOTOR CAR, SHOWING END CONSTRUCTION

ment underneath the car. This has been accomplished in a way which has not only given an exceptionally even weight distribution but has left every piece of apparatus accessible. These new passenger cars were built by the Cincinnati Car Company.

REBUILT CARS FOR TRAILERS

As it was planned to use trailers with the new motor cars in the fast limited service between Indianapolis and Louisville, the Interstate Company is planning to provide the trailers by rebuilding old motor passenger cars, one of which has been completed and placed in service thus far. This rebuilding work was done by the American Car & Foundry Company, Jeffersonville, Ind. While of wood construction, the trailer was given the appearance of a steel car by putting steel plates on the sides. The underframe was strengthened by using pressed-steel sections to reinforce the I-beams and channels. The ends were rebuilt to conform to the same radius as that of the motor car and reinforced with



INTERIOR OF REBUILT TRAILER WAS FINISHED IN PLEASING WAY

anti-telescoping construction similar to that used on the motor cars and anti-climbers. Both vestibules were inclosed, and while arranged for double-end operation, the vestibules were so built as to be used for an observation platform at the rear of the car. The end windows were glazed with $\frac{1}{4}$ -in. polished glass which was brought down to within 12 in. of the floor. Four standard Pullman folding chairs are placed in this rear vestibule, and these are removed to the opposite end, if for any purpose the direction of running the car is reversed. An advantage of closing up the rear vestibule and using it for an observation platform is that it automatically blocks entrance and exit at this end and forces the ingress and egress of passengers at the forward end, so that when the trailer conductor is back throwing a switch or protecting the train, the conductor on the forward car can watch both the motor car and trailer entrances.

The trucks used are old Peckham design with 6-ft. 4-in. wheelbase equipped with new springs and having good riding qualities. The old Gothic sash were removed and double letter boards installed. The car was also equipped with permanent storm sash. A smoking compartment was arranged for the trailer by building in a compartment at one end in a manner similar to that employed on some Pullman cars. This is equipped with two long cross seats which will seat eight passen-

DATA COVERING NEW PASSENGER CARS

Length over buffers.....	62 ft.	0 in.
Length over dash.....	60 ft.	6 in.
Height rail to top of roof.....	13 ft.	1 in.
Extreme width.....	9 ft.	2½ in.
Width of seats.....		38 in.
Width of aisle.....		28½ in.
Rail to bottom of sill.....		43 in.
Length of rear platform.....	6 ft.	4 in.
Weight.....		95,500 lb.
Seating capacity.....		60
Post centers.....	2 ft.	8½ in.
Length of baggage room.....	8 ft.	3 in.
Truck centers (approximate).....	39 ft.	0 in.
Wheelbase.....	7 ft.	3 in.
Size of wheels.....		36 in.
Baggage door opening.....	3 ft.	10½ in.
Bulkhead door openings.....	2 ft.	4 in.
Rear door opening.....	2 ft.	5 in.

gers. The room is curtained off from the side aisle leading from the vestibule around to the main passenger section. A toilet equipped very much like that of the motor car was installed at the end of the car body opposite from this smoking room. The floor plan and various dimensions of this car may be seen in an accompanying drawing. The trailer is 51 ft. 3 in. long over buffers, weighs 54,000 lb. and has a seating capacity, including the four chairs on the observation platform, of fifty-one.

The hot-water heater is very neatly and compactly installed at the end of the car between the smoking room and the bulkhead and inclosed in a cabinet so that it is entirely out of the way and, consequently, unobserved.

The interior finish of the car is practically identical with that of the motor car, including the mahogany finish, white headlining, Wakefield fabrikoid covered seats, central lighting with two circuits of 94-watt lamps, etc.

The trailer and motor car are equipped with a Faraday signal system which is arranged in such a way that any conductor can send and receive a signal at the same time. Thus, if a rear conductor gives a stop signal while the forward conductor is passing up a go-ahead signal, the latter will get the signal from behind simultaneously and will be able to reverse the signal he may be giving. This is all worked out so that there is only a single wire between cars. The bell cord on one car rings the buzzer on the car ahead. The motorman's signal on the motor car is a single-stroke bell.

THROUGH PASSENGER SERVICE OF THE INTERSTATE

Through trains have been operated between Indianapolis and Louisville since 1908, this service requiring until recently the use of cars equipped for both 600 and 1,200-volt operation. For some time back six limited trains each way each day, making the trip in four hours, have been run. With the difficulties of two different voltages eliminated and the new cars in service, it is expected that this service will soon be replaced by seven limited trains a day each way, and that the run will be made in three and one-half hours. The shortening of the running time will be made as rapidly as track and power conditions permit. At present limited trains leave Indianapolis for Louisville at 7, 9, 12, 2, 4 and 7 o'clock each day. Northbound, trains leave Louisville at 7:30, 9:30, 11:30, 1:30, 4:30 and 6:30 o'clock every day. Southbound the trains are called "Dixie Fliers" and northbound "Hoosier Fliers."

When the new cars were installed Mr. Reid invited a party of prominent business men and city officials from Louisville to be the guests of the company for a trip to Indianapolis and return on one of the new cars. A week later a similar party of Indianapolis business men and officials was taken to Louisville and return. In ad-

dition to the special attention which these parties called to the Interstate company through the public press, the new cars have otherwise been the source of a great deal of very favorable advertising for the company and have undoubtedly attracted patronage to the road. The company also capitalized on the installation of the new cars for some good purchased advertising, though so much news matter about them appeared in the newspapers that not a great deal of purchased space was neces-

sary to inform the public of the improvement which had taken place.

In two following issues will appear descriptions of the new freight equipment placed in service by the Interstate, the new shop layout, the changes in the power system and the new substations, the freight service and nature of business handled and other points of interest in connection with the making of a railroad out of the interurban lines between Indianapolis and Louisville.

Southwestern Association Meets

Publicity and Public Relations Formed an Important Part of the Program of the Annual Convention at Galveston on May 18-21

THE seventeenth annual convention of the Southwestern Electrical and Gas Association was held at Galveston, Tex., May 18, 19, 20 and 21, with somewhat more than 250 delegates present. A. Hardgrave of Dallas, president, presided during the convention, and H. S. Cooper, secretary of the association, occupied the secretary's desk.

At the closing business session Saturday C. E. Calder, vice-president of the Dallas (Tex.) Railway and other Strickland interests in north Texas, was elected president; Alba H. Warren, vice-president and general manager of the El Paso (Tex.) Electric Company and former general manager of the Galveston Electric Company, first vice-president; S. R. Bertron, Jr., of the Houston Electric Company, second vice-president; John W. Carpenter of the Dallas Power & Light Company, third vice-president; J. M. Dickey, Galveston, treasurer. The executive committee will choose a secretary, and it is assured that H. S. Cooper will be retained in this position. This committee will also select a meeting place for next year and fix the time for such meeting.

News of the death of Col. J. F. Strickland of Dallas, president of the Texas Electric Railway, the Dallas Railway and various other north Texas utilities, was received just after the convention adjourned, but the delegates still in the city were called together and adopted suitable resolutions expressing sympathy for the family of Colonel Strickland and expressing profound regret at the death of such a leader among the traction men of the country.

The convention was called to order Wednesday afternoon by President Hardgrave. Mayor-elect Charles A. Keenan extended a welcome to the delegates, and this was responded to by D. A. Hegarty, general manager of the Brush Electric Company of Galveston, on behalf of the association.

A feature of the first session was an address by Martin J. Insull of Chicago, president of the National Electric Light Association, who urged that the public utilities of Texas and of the entire country enter into a joint educational campaign with a view to acquainting the general public with the true condition of the various companies. He laid particular stress on the fact that in this way the co-operation of the people can be obtained. Mr. Insull also urged the various companies to offer for sale and to put on campaigns to induce their patrons to buy stock, thus making the companies more or less co-operative.

Mr. Insull also addressed the convention on Wednes-

day, this being his principal address. As senior vice-president of the Middle West Utilities Company of Chicago, which operates in more than 500 towns of the Middle West and East distributed in fifteen states, Mr. Insull stressed the value of publicity. The general public must be informed of the credit conditions of the various electric light and power and traction companies if the credit of these companies is to be restored and maintained.

Mr. Insull described the national advertising campaign projected during the last year by the National Electric Light Association, and explained that more than \$1,000,000 had been spent to finance it. He said that this campaign is to assist the central stations of the electrical industry in obtaining friendly public opinion. For, he declared, if local agitation would die out, the ability of the local utility company to secure money would be improved. Mr. Insull declared that the American public is absolutely fair, provided facts are presented to it, and that the public utility companies need have no fear of the outcome if they centered in a publicity campaign.

President Hardgrave, Texas manager of the Middle West Utilities Company, in his annual address, delivered at the opening session, also stressed the need for a publicity bureau for the public utility companies. He declared that confidence between the public utilities and the people must be established, for, he said, the growth of a community depends upon the growth of the public utilities. One sure way to obtain this confidence, he said, is to encourage the purchase of stock in the utilities by the public. Mr. Hardgrave also recommended several changes in the constitution of the association, one being that the rule providing that the third vice-president be automatically promoted until he shall become president of the association be abolished. Mr. Hardgrave also stressed the importance of committee work, and recommended additional committees and that more questions be referred to committees for action. Work in committee, he said, will greatly increase interest in the association and promote efficiency in its work.

The report of the recently appointed "public policy" committee, of which W. B. Tuttle, first vice-president of the San Antonio Public Service Company, was chairman, was read and adopted. This report also laid great emphasis on the importance of a publicity bureau for the association. Mr. Tuttle recommended that a trained newspaper man be employed to head the bureau and that his special duty would be to keep the members of

the association and the newspapers of the state informed about the public utilities. Mr. Tuttle also said that the best way to get the people of Texas interested in their public utilities is to induce the people to invest in the utilities.

The report of Secretary H. S. Cooper summarized the work of the secretary during the year and gave some statistics of the association. The association has now 166 member companies among the privately owned public utilities in Texas and the Southwest and there are also a number of honorary members, the secretary being one of them.

J. H. Gill, assistant general manager of the Dallas Power & Light Company, addressed the convention on Friday. Mr. Gill declared that many towns have literally starved their public utility companies to death, through lack of knowledge of what the utilities were doing. It is the duty of the people to come to the aid of these companies, he said, and added that in nine cases out of ten the aid needed will be forthcoming if the people are informed of the real conditions. Publicity and direct interest of the public in the utility company through stock ownership were the underlying thoughts of Mr. Gill's address, and his recommendations met the indorsement of the convention.

E. P. Schoch, head of the department of chemistry of the University of Texas at Austin, made a brief address, explaining in technical terms the latest developments in the tests of Texas lignite as fuel for steam boilers. Mr. Schoch predicted that developments soon would prove that Texas lignite is the cheapest boiler fuel that can be had in Texas.

The trend of legislation in regard to utilities was discussed on Saturday, the closing day of the convention. A plea for state control and sound financing marked the papers and addresses.

FORMER MISSOURI COMMISSIONER ADDRESSES CONVENTION

Senator William G. Busby of Kansas City, former chairman of the Public Service Commission of Missouri, discussed "State Utility Commissions." Mr. Busby first told of struggles the commission had had to obtain proper recognition from both the utility companies and the general public. He then related the work of the commission and told of the success that had been its lot. He declared that the life, health and happiness of the people and the progress and growth of a community or city depend upon strong, healthy utilities, and that it is to the interest of the people that the public utilities should be treated fairly in the valuation of their property and in fixing their rates. He further declared that this degree of fairness could be obtained only through state utility commissions. In regard to sound financing Senator Busby said that every community is known by the character of its utilities and that people do not want to live or transact business in a city or community without utilities, transportation and power and lighting facilities, and that unless the utilities are treated fairly, investors will refuse to advance funds for their development or extension and the public will eventually be the loser.

M. H. Gossett of Houston, president of the Federal Farm Loan Bank, next gave his viewpoint of financing Texas utilities. Mr. Gossett said the franchises granted to any utility should be protected by the community, for where competitors are permitted, the service of the utility is impaired and the financial rating of the com-

pany lowered. He illustrated his point by mentioning the situation in Houston, where the jitneys are permitted to operate as competitors of the street railway lines. Mr. Gossett said the ideal way for financing any utility is by selling stock to the company's employees and to the public.

W. B. Head, vice-president of the Texas Power & Light Company of Dallas, discussed the trend of public utility legislation in Texas. He traced the development of such legislation step by step and told of the law now in effect that places the control of utilities in the hands of the city where such utilities operate. City Councils and city commissions in Texas, he said, are given as much power and authority over public utilities as Legislatures in other states. The viewpoint of any city is naturally unfair to the utility, he said, and the result is that utility companies in Texas are suffering. Community control of public utilities, as tried out in Texas, is an absolute failure, Mr. Head declared. Many times the utilities serve much territory beyond the jurisdiction of the city government, he said, and this makes it imperative that control be vested in a state commission.

Home town financing was discussed by S. J. Ballinger, commercial manager of the San Antonio Public Service Company, and G. W. Fry, general manager of the Abilene Gas & Electric Company.

At the concluding session Saturday, M. M. Phinney of Boston, formerly connected with the Stone & Webster interests in Texas, was elected to honorary membership in the association.

At the railway section meeting a number of interesting topics were discussed.

Committees appointed at the closing session of the general meeting follow:

Executive Committee.—Burr Martin, A. Hardgrave, C. E. Calder, Alba H. Warren, H. C. Morris, Charles W. Davis, S. R. Bertron, Jr., F. D. Murphy, W. B. Tuttle, G. H. Clifford, Howard Smith, R. J. Irvine, D. A. Hegarty.

Advisory Committee.—H. O. Clarke, K. L. Simons, F. L. Weissner, H. E. Danner, B. F. Cherry, A. Patterson, W. E. Wood, J. C. Kennedy, James P. Griffin, P. E. Nicholls, H. E. Borton, Frank Frost, P. A. Rogers, P. W. Campbell, C. Mason, L. L. Stephenson, H. B. Hearn, W. A. Darter, V. W. Berry, H. P. Hess, H. E. Hobson, F. G. Kune, C. A. Newning, Mac F. Sterrett.

Finance Committee.—J. E. Van Horn, R. G. Soper, C. H. Dickey.

RESOLUTIONS ON DEATH OF COLONEL STRICKLAND

Just after the convention adjourned news of the death of Col. J. F. Strickland of Dallas was received, and the meeting was immediately called to order again and the following resolution adopted:

In the death of Mr. Strickland not only has this association lost a loved and respected member, but also one of its founders, its first president, and one who has, in the seventeen years since, been a wise counselor and a vital force in all its work.

We feel further that the entire public utility interests of Texas have suffered an irreparable loss, for Mr. Strickland was the undaunted pioneer in the wide distribution of electric light and power and electric transportation throughout the state, and the people of Texas owe him a debt which can never be repaid.

And finally, as an employer, a counselor, a friend—even as an acquaintance—we will all miss him deeply and mourn him sincerely. Ever ready to aid, to advise, to be of use; kindly, courteous, generous and always just, we feel in his death a sense of personal loss which, at this moment, it is impossible for us adequately to express.

Merchandising Transportation

This Is the First of Several Articles on This Subject—The Author Considers, First, the Principles Governing the Successful Merchandising of Transportation and Then Shows What the Employees Can Do to Help

By W. H. BOYCE

General Manager Beaver Valley Traction Company, New Brighton, Pa.



THE EMPLOYEES' FIELD DAYS BEGIN AT 8:30 A.M. AND END AT 11:30 P.M., SO THAT ALL CAN PARTICIPATE

YOUR success and the success of your company depend upon your ability to sell car rides.

It matters not what the expenses are if you can so merchandise transportation that there is a comfortable space between the expense and receipt lines when graphically displayed.

Selling rides depends in a very great measure upon:

1. The loyal co-operation, knowledge, interest and ability of your employees.
2. The methods you pursue to secure co-operation, impart company business knowledge, create interest and reward ability.
3. The proper maintenance of track, rolling stock and schedules.
4. The quantity, character and timeliness of your advertising through newspapers, car cards or pamphlets.
5. Your heart and surface attitude toward your public.

One reason that the sale of street car rides has not kept pace with the strides made in the sale of any other commodity or service is that as a rule street railway companies (on the theory that they could not afford it) have not paid salaries sufficient to attract new, worth-while blood, or to hold their more progressive employees. This short-sighted policy is comparable to that of the merchant who curtails his advertising as his business declines, and then makes generous appropriations to the advertising department when he has more orders than he can fill.

If your case is a usual one, your receipts have not kept pace with your expenses. You need more car riders. You need more than the commonly termed necessity riding. Therefore you must be possessed of reliable and up-to-date records concerning your actual traffic conditions and the traffic possibilities which your system affords. Careful study of these records should precede your merchandising plans, which might well

be tried out on one route before a general application is made.

If you say to yourself that nothing more can be done to secure additional riders for your system your case is hopeless. No wonder you are not being paid more. You are probably howling and raving at the newspapers, the public, the commissions and your employees. Those methods will not sell car rides.

Finding out when, where and how people get to work and learning what it costs those who are not your patrons, in time and money, will form a basis for getting additional car riders.

It is true that you may not be able to adjust your service or rates of fare to get them all, but if for a starter you can get a few from each mill, factory, store or movie, that will be a great help.

The riding habit is a desirable thing to have your public acquire. They will acquire it if you are ever mindful of their desires, convenience and needs.

You must be not only a good mixer but you must use that trait to better your relations with your public. You must bear in mind that your employees and your public are entitled to their own viewpoints of your treatment or your service, and you must be able to visualize both sides of each question.

You must know that customers are sensitive. They go where they are invited and continue their patronage where well treated.

Your rides must be of a marketable quality. You must sell them in the size package for which there is a demand.

Business of all kinds is being built on the theory of giving the customer what he wants, or what he would want if he knew all the circumstances. It is your duty to give him what he wants, so far as possible, and to acquaint him with all the circumstances.

Service that suits your car riders—not you—is the service that counts in merchandising transportation.

The success of any business depends upon the hearty co-operation of all the employees. It is impossible suddenly to get a perfect working force, and therefore a good working organization comes through the process of evolution and elimination.

To secure the co-operation of employees they must know and feel that they will always be squarely dealt with, that fair and impartial treatment will always be accorded them, due consideration being given to each contributing factor, and that merit, not influence, will win. This policy, supplemented by meetings at which the proper kinds of addresses are made and by thought

Notice to Trainmen

June 6, 1919.

Saturday, June 7,

Will be "Big Day" for all Beaver Valley Traction men.

Can you put it through without an accident of any kind? I believe that you can.

Keep cool. Don't get excited.

Romp on your gong and keep your car under control. *Expect the other fellow to do just what he should not do.* Watch the track ahead—watch crossings, both ways. Be all business this day—be polite—be careful.

I thank you.

Superintendent.

Bulletin No. 334

June 9, 1919.

Notice to Trainmen

We thank you, Saturday was a "big day." You did fine work. You handled an immense crowd of people. *We knew you could get away with it. There was not an accident in which our trainmen were to blame.*

True, there were three occurrences:

1. Windows broken by load on passing truck.
2. Car and auto in slight collision.
3. Rear of car 411 touched by yellow car at Iroquois Place, Beaver.

It was a hard day for everybody, and despite the three occurrences mentioned, we are inclined to rate it 99½ per cent perfect for our own crews.

We expected a perfect score and you came very close to it.

Accidents cost us a lot of money and it all comes from funds that should go toward operation and wages. You save funds for payment of your wages when there are no accidents.

We commend you for your careful work of Saturday and want you to make a perfect score daily your standard.

Superintendent.

Safety Engineer.

NOTICES SHOWING THE RELATIONS OF MEN AND COMPANY

Notices were sent to the trainmen telling about the "Big Day," and when it passed without accident the men were commended.

creating and correcting bulletins, should produce the desired results.

This is an everlasting job.

The knocker and the faultfinder are ever busy.

You must learn from all available sources causes of discontent. These sources may be secret as well as through your subordinates and employees' committee.

When causes are ascertained the remedy should be immediately applied, as it can be in most cases, for as a rule the cause is a trivial one.

Sometimes it is a hard matter to get the other fellow's viewpoint. You think of the days he has had off on full pay. He thinks of the overtime he has put in. You think of the enormous increase in his monthly wages. He compares the percentage of his increase with the percentage of increase that the laborer and steel mill worker has had. And so on to the dividing point if you and he don't get onto common ground and reach an understanding.

An understanding of how and why a good thing is done for him must be had by the average employee. He is naturally suspicious of anything "just handed to him." If you contemplate the presentation of a free

The presence of yourself and family is requested at the
Beaver Valley Traction Company Employees'

Tenth Christmas Tree

Junction Park Pavilion

Tuesday Evening, December 21, 1920

from 6 o'clock p. m. to 10 o'clock a. m.

DOORKEEPER WILL ADMIT _____ PERSONS ON THIS CARD

CHRISTMAS IS ALSO CELEBRATED

life insurance or health policy or the creation of a pension fund, your employee must be made first to understand the why and wherefore and made to desire earnestly that which you would give. To thrust such things upon him creates suspicion.

Employees desire a medium of expression. Some of them prefer their committee. Some make use of the suggestion box and especially prepared suggestion blank, while some prefer to give expression to their views and feelings in an interview with an official of the company. These safety valves must all be kept free and working.

No matter how small the system no one man is big enough or closely enough in touch with all the conditions to know it all.

If an employee makes a verbal or written suggestion, whether good or bad, a written acknowledgment of that suggestion must be made and the employee advised of the action taken or contemplated. If the suggestion is not considered applicable, a reason must be assigned. The next suggestion of that same employee may save you hundreds or thousands of dollars. However, the next suggestion will not be forthcoming if your employee has any reason to feel that it will not receive careful consideration. Make an appeal for suggestions on some specific topic. Make of your suggestion box a question and answer box.

Department heads, as well as the rank and file, must

Traction Company Employees Loan to Employers at Six Percent to Make Up Deficit

Movement First of Kind Ever Inaugurated in Valley by Public
Service Concern—Some Offer Larger Amounts

Employees of the Beaver Valley Traction company and the Pittsburg and Beaver Street Railway company yesterday responded to a call for financial assistance to meet the deficit in operating expenses when each employee loaned the sum of \$10 from his semi-monthly pay, the first of four such payments, the total of which, with reduction of expenses, is expected to meet the immediate pressing obligations of the two companies.

General Manager W. H. Boyce, at three department meetings of the employees, \$10 per pay, for the next four pays, of \$40 each, it would be possible to meet the situation for the next two months. Employees making the loans were assured that they would not only be given a receipt showing the payments but would receive interest at the rate of six per cent when the money was paid back during the months of June or July.

The movement is declared to be the first of the kind ever inaugurated by a public service concern. Several offers of larger amounts were made. These amounts ranged from \$50 to \$1000.

CLIPPING SHOWING WHAT THE MEN THINK OF
THE MANAGEMENT

at all times co-operate. They are not co-operating if they are faultfinding and complaining of the methods in vogue in other departments. It should be distinctly understood that it is not only the privilege but the duty of the head of one department to take up verbally with the head of any other department any known condition which is not to the best interest of the company or its employees as a whole.

Misunderstandings will be cleared up and may be prevented through the medium of frequent individual and round-table meetings. However, little good can result from these department head meetings if a choleric, self-opinionated individual presides. He must be big and broad enough to weigh carefully any proposition advanced.

Deliver me from being a stock, bond or job holder on a property the head of which "knows it all."

He who surrounds himself with subordinates who never have an original idea and who if

4. Properly caring for those injured through no fault of their own.

5. Insistence that men be not reprimanded in public.

6. Advertisements directed to the public acquainting them with the difficulties a public service employee encounters in a day's work and asking their indulgence and co-operation. Be sure that your employees see these advertisements.

7. Keep employees' quarters or lounging rooms clean and attractive and fitted with amusement devices.

8. Provide loan fund to keep them out of the hands of loan sharks.

9. In individual cases that demand it, furnish free medical or legal advice.

10. Give time and consideration to an individual employee or a committee of employees.

11. Keep the door open and give them the benefit of the judgment of individuals of your staff on personal matters.

12. Keep them acquainted with financial condition of the company.



VIEWS IN THE MEN'S ROOMS; PREPARED FOR ALL THE NEEDS—RECREATION, REST, CURE

they do have one occasionally are fearful of the consequences of advancing it is riding to a fall. Of what use are subordinate officers who agree with each and every proposition advanced by the management?

Railway managers today don't need vanity ticklers or looking glasses. They need the services of cartoonists. The following will help to secure the good will and co-operation of employees:

1. Get-together meetings such as at a Christmas tree celebration or a field meet for employees and their families.

2. The serving of hot coffee at a predetermined minimum temperature and iced tea or lemonade on July 4 or other holidays or days of heavy traffic on which employees are compelled to work unusually hard or overtime.

3. Free lunch for employees working overtime during stormy weather.

13. Don't fail to give credit where credit is due.

The following statement is from a handbook given to each employee by the company with which the writer is connected:

To the unlearned and the one who will not take the trouble to find out, and the one who will not be convinced when shown the facts, the solution of the street car problem is always "Too much watered stock." They do not know anything about it. It is not a fact as applied to these lines.

Besides—

Organization of the company or the amount of stock issued has nothing to do with the service you are to give the patrons of this line. All people must at times have something to be dissatisfied about. Many people pick the street car company and its employees for expression of that dissatisfaction—that is to be expected. In days gone by street car companies would let them go ahead and not enter any protest, and as a result, in the way of the "bully" who displays his power over the weak, a great many contracted the habit. That very growing popularity of find-

ing fault with the street car company has forced that animal to back up against the wall and fight for his very life.

Now—

Exhausted in finance, and wilted by competition, the tables are turning and the day looms up that the people must respect the rights of the company or the burden of furnishing this popular method of transportation will fall upon each community to furnish or do without. Up to the time of going to press with this book, a total of 498 miles of track was abandoned in the United States in the year 1918 alone.

And—

in no case did the faultfinders come forth and supply adequate transportation—the lines remain dead; property values dropped to a small percentage and live wire citizens deserted the community, *for with the loss of the cars life was not worth while there.*

So long as the company pays your wages (and be it in your opinion a just or an unjust wage, it is the one you agreed to work for), your every act should be in the interest of this company and when you find it difficult so to act, *we will gladly grant you a permanent vacation without pay. We have so many others to contend with that each employee should help lighten our burdens and good will then result for both of us.*

Getting More Power Out of the Locomotive

AT A MEETING of the New York Railway Club held in New York on May 20, 1921, George M. Basford read a paper on "Vitalizing Locomotives." This is of interest to men interested in the development of the electric locomotive as showing what this machine is up against by way of competition.

As an example of the progress that has been made with the steam locomotive Mr. Basford cites a well-known road which has increased its average revenue tonnage from 400 to 1,700 per train in twenty-five years, the maximum revenue tons handled in a regular train being 3,200. This road shows 233 per cent increase in weight of trains and 66 per cent increase in speed in this period. It hauls 5,000-ton trains on 25-mile schedules. Taking the country as a whole the average revenue train load increased from 475 tons to 728 tons since 1915, an increase of over 53 per cent. Increase in capacity of the steam locomotive has been due particularly to the superheater, the brick arch, the feed-water heater and the booster. Since 1910 the railroads have applied 33,000 superheaters to new and old locomotives, about 90 per cent of the new ones having been equipped during the past few years.

For many years arches have been used in locomotive fireboxes, their functions being to baffle the gases and flame on their way to the flue. Arches protect flues and flue sheets, increase the heat-making capacity of the coal and reduce boiler failures. In present practice they are carried on arch tubes which not only support the arches but contribute materially to forcing the circulation of the boiler. More than 43,000 locomotives now have these arches.

The application of the feed-water heater to the locomotive has been attempted many times and has waited only for a practicable heater and pump. Europe is far ahead of the United States in applying feed-water heaters to the locomotive, although for generations stationary and marine steam plants have used them as a matter of course. They have, however, been in successful use on locomotives during the four years past, returning for reuse about 15 per cent of the exhaust steam in the form of distilled and filtered water. The result is an increase in tender tank capacity, while at the same time heat from the exhaust steam is returned to the boiler in the feed water.

The booster is an auxiliary driving equipment which boosts the train in starting and at critical points on grades. It utilizes weight and steam that are not needed for other purposes at low speed, the only speed at which the boost is needed. The booster works like an automobile in low gear; it applies its extra power smoothly, avoiding the jerks that a big engine otherwise must give in order to get started.

House Approves Commerce Estimates

Would Give Hoover Funds to Carry Out Plans, Among Them Study of Possible Furthering of Standardization

WHILE it took a special rule to do it, the House of Representatives has approved the supplemental estimates for the Department of Commerce, recommended by the committee on appropriations, for extending the export trade; for investigating structural material; for assisting in the establishing of industries developed by the war and for standardizing electrical and mechanical devices used in industries. What opposition existed was entirely on political grounds, but the attack did not have the backing of the Democratic leaders, however, as Representative Byrnes, the ranking Democrat of the appropriations committee, declared that it was not a question of politics; that the business and the general interests of the country demand the promotion and extension of our commerce, domestic and foreign, and that every possible aid should be given to the administration.

Representative Good, the chairman of the committee on appropriations, in explaining the feeling of the committee in regard to the appropriations for the Department of Commerce, said, among other things:

"Mr. Hoover realizes that conditions in the world today are such that it is going to take the very best men he can get as counselors and advisers to help advise American industry and American commerce how our trade with foreign countries can be extended and enlarged. I was unwilling and the ranking Democrat on the committee was unwilling and every member of the committee on appropriations was unwilling to take the responsibility for denying this appropriation." In supporting the Bureau of Standards items, Chairman Good said, in part:

"Secretary Hoover called attention to the fact that through the National Screw-Thread Commission the hardware dealers of America were saved a capital charge of from \$15,000,000 to \$50,000,000 on their stocks of bolts alone. Mr. Hoover is convinced that hundreds of millions of dollars can be saved if a standardization of hardware alone can be brought about. So it is in all of the industries. Mr. Hoover estimates that one of the big elements of increased cost is the great number of different standards that every dealer must carry.

"The Secretary has in mind to build up an industrial unit that will standardize these various items. It is a big idea. It is a big thing. The Secretary of Commerce has done big things. He will do big things in the future for the country, if we of the House can adopt a progressive, constructive policy upon which he can build. We have placed in the Department of Commerce one of the greatest engineers in America and we are going to support him."

The Plight of Vienna's Railways

Austrian Capital Has Little More Than the Ruins of a Once Efficient Transportation System—Lack of New Material, Worn-Out Equipment, Decreased Traffic and an Inflated Currency Make Recuperation Difficult and Slow

THE end of the war found the electric railways of Vienna in a position extremely difficult in several ways. The exigencies of the war have taxed both the roadway and the rolling stock of the lines to an unprecedented extent. While the population of Vienna and the traffic increased, means of transportation were reduced. The municipal steam-operated lines were to a large extent reserved for the transportation of troops, and the number of horse-drawn and motor vehicles diminished gradually. This produced a large influx of street car passengers. The street car lines played an important part in the Red Cross service, more than 1,200,000 wounded having been carried by them during the war. Many cars were adapted for ambulance work and were withdrawn from ordinary passenger traffic.

Moreover, the lines took a large, and during the war increasing, share in the goods transportation within the precincts of the city. Even under ordinary circumstances such strain would have resulted in a run-down condition of the whole system. The shorthandedness in the repair shops and the increasing use of substitute material have added to the extent and progress of the deterioration. The limited resources of copper were reserved solely for army requirements. Steel wire for the overhead lines and aluminum as a substitute for the copper conductors of the motors had to be used. Especially the lack of good quality lubricants tended largely to wear out the rolling stock, and indirectly also the rails. At the end of the war the difficulty of maintenance, instead of diminishing, had increased.

The disorganization of all Austrian industry following the armistice produced a more serious stringency of material than ever existed before. The general labor unrest seized the repair shops of the street railways, the efficiency of which sank down in a sharp curve. Progress of work was frequently interrupted by strikes. Cars were withdrawn from service in increasing numbers, and the workshops were clogged by accumulations of repair work. To such conditions was added the distressing shortage of coal. Vienna has lost its main coal resources by the armistice to Czecho-Slovakia. The present Austria has deposits of coal, chiefly brown coal, the exploitation of which had, however, been neglected in pre-war times, and was, although considerably advanced during the war, at the end of it entirely inadequate for the country's requirements. Political and financial conditions prevented the country from obtaining sufficient supplies from other sources. As a result, the traffic had to be reduced considerably, and at times came to a complete standstill for days at a stretch. At the beginning of the coal shortage, which made itself felt even in the last years of the war, the number of stops were reduced from 980 to 682, as a remedy. This resulted in an energy saving of 8 per cent. Later on, lines were put out of operation entirely or partly. Also, operation was reduced according to the coal at disposal, sometimes to seven hours a day.

This shortening of working hours seems to have given

the harassed management the necessary breathing spell for reorganizing operation and for making repairs. The difficulties had evidently reached their climax in 1919, and an improvement became apparent at the beginning of the subsequent year.

The basic factors of this improvement are the betterment of the coal supply and of the labor condition. Both have continued in a steady progress since then. The improvement of the system was, however, confined to narrow limits, not by the lack of efforts, but by the depreciation of the Austrian currency. The track mileage of the whole system has been increased since 1914 only by 7.5 km. (4.6 miles) to 274 km. (170 miles), 20 km. (12.4 miles) of which are operated by steam, the rest by electricity. All railroad terminals are now connected to the street-car system. For the new track, rails of the grooved-girder and the T-section type have been used.

For overhead conductors round copper wire of $\frac{3}{8}$ in. diameter has been adopted, in place of the wire of special section used before. The tendency is gradually to replace the steel wire by copper wire, as expenses permit.

SYSTEM OF RADIAL AND RING LINES INTRODUCED

Many changes have been made with regard to routing. The old-time cross-town routes, connecting widely distant parts of the city by a circuitous way, have dwindled down to fourteen. According to the layout of the city, the main traffic is now being taken care of by a system of forty radial lines, intersected by ring lines. Fourteen of such ring lines are now in operation, the inner circle being the ring street, the famous boulevard of Vienna.

The number of cars in use has since the beginning of 1914 been increased by fifty-six motor cars, up to 1,542, and by seventy-nine trailers, to 1,628. It speaks well for the enterprise of the management that with a few exceptions this increase was effected in post-war years, in spite of the enormously grown expenses, the price per car being now 2,500,000 kronen (\$6,250 as of May 18, 1921) compared with 25,000 kronen (\$5,075 normal exchange) before the war. All additions to the rolling stock are fitted with the latest improvements, the motor cars being of the double-deck type, with specially cushioned trucks. The platforms of these cars and those of the trailers are completely inclosed. The separation of entrance and exit, introduced in Vienna simultaneously with America, is rigidly adhered to. The mechanical equipment of the cars has remained unchanged. As a novelty may be mentioned the gradual replacement of spur gears by herringbone gears of the Maag type.

Experiments have been made with street-sweeping machines attached to the cars, the testing of which is not yet completed. For the housing of the cars, several sheds have been erected, three of which are of reinforced concrete construction, with sufficient space for

270 cars. To the street car system is connected a system of several motor-bus lines, to act as traffic conveyors to the terminals of the lines. One of these lines is of the trackless-electric type. The whole rolling stock of this service consists of 47 cars.

HEAVY FREIGHT TRAFFIC DURING THE WAR

The goods transportation of the system decreased, due to the stoppage of military transport. From 1914, when goods transportation on street railways was introduced, up to the middle of 1920, nearly 1,400,000 tons were transported. It might also be mentioned that the Vienna street railways played an important part in the American relief work for the Viennese children in the transportation of food, of which 511 tons were conveyed during the year June, 1919, to May, 1920.

The accidents showed a decrease. The following data are given in this respect:

	1919-20	1918-19
Accidents, total.....	6,012	7,400
Number of injured.....	466	635

Most of these accidents were caused by passengers jumping on or off cars while in motion. Accidents of this kind averaged 5 per 1,000,000 passenger-rides. Of the total, 1,308 accidents were due to collision with other vehicles, 520 to knocking down of pedestrians crossing the lines, and the rest to various other causes. Eight hundred claims for damages were brought in against the street car company, of which 560 were settled by agreement and the rest in court. The total damages paid during 1919-20 amounted to 1,044,000 kronen for personal injuries, and 200,000 kronen for damage to property.

The following is an account of the operation and the revenue for the year June, 1918, to May, 1919, and the same period 1919-20:

STATEMENT OF INCOME			
	1919-20 Kronen	1918-19 Kronen	Per Cent Change
Passenger revenue:			
Single fares.....	485,354,465	154,043,771	215.1
Time tickets.....	16,166,657	3,552,878	355.0
Line tickets.....	9,449,570	1,906,862	395.0
Special cars.....	115,725	99,754	16.0
Freight revenue.....	1,204,496	928,423	29.9
Total.....	512,290,913	160,531,688	
Share in revenue of Vienna Steam Railway.....	1,865,473	650,586	186.7

TRAFFIC STATISTICS			
	1919-20	1918-19	
Car kilometers:			
Motor cars.....	36,740,953	37,304,283	1.5
Trailers.....	48,990,656	50,494,731	3.0
Freight cars.....	1,301,250	1,176,212	10.5
Total.....	87,032,859	88,975,226	2.1
Kilowatt-hours used.....	40,641,939	43,256,667	6.0
Revenue passengers:			
Single fare.....	443,004,424	531,626,528	16.7
Time ticket.....	21,415,200	16,159,800	32.5
Line ticket.....	16,629,124	12,427,572	33.8
In special cars.....	446,715	498,767	10.4
Total.....	481,495,463	560,712,667	14.2
Number of parcels carried by freight department.....	21,156	30,156	29.8

NOTE—Figures in italics indicate decrease.

The highest daily receipts of the year 1919-20 were 2,700,000 kronen and the lowest 492,000 kronen, the latter on a day on which operation was reduced to seven hours.

The most incisive change with regard to the Vienna street railway system is the increase of the rate of fares. Before the war the fare was 0.14 kronen (2.8

cents) on weekdays, and the highest fare 0.20 kronen (4 cents) on Sundays. It is at present 5 kronen (\$1.02) on ordinary days and 7 kronen (\$1.42) on Sundays. As a peculiarity it may be mentioned that the fare to the Vienna racecourse, roughly 2½ miles from the center of the city, has been fixed at 30 kronen (\$3.09). For fares on late cars, running after the closing hour, chiefly for the connection between railroad terminals, 10 kronen (\$2.03) is charged. Blocks of tickets of five each, at a reduced price of 4.50 kronen (91.5 cents) instead of 5 kronen, can be bought in advance, as a convenience to passengers. A very large use of these is being made. For the working people, cheap tickets for 3 kronen each are issued, available up to 8 o'clock in the morning. Transfer tickets have been abandoned completely, and instead return tickets were introduced at 7 kronen, available for two rides over the same line in one day. Children's fares are 1.50 kronen (30.5 cents). These equivalents are in pre-war exchange. From the following list the movement of the fares can be seen:

Charges in Rates of Fare		
Up to June 7, 1916.....	0.14 kronen	(2.8 cents)
June 7, 1916-Aug. 28, 1918.....	0.22 kronen	(4.5 cents)
Aug. 28, 1918-June 11, 1919.....	0.30 kronen	(6.7 cents)
June 11, 1919-Dec. 3, 1919.....	0.60 kronen	(13.4 cents)
Dec. 3, 1919-Feb. 18, 1920.....	2.90 kronen	(40.6 cents)
Feb. 18, 1920-Jan. 27, 1921.....	3.00 kronen	(60.9 cents)
Jan. 27, 1921.....	5.00 kronen	(101.5 cents)

The rise of the fares was in each case followed by a sharp decline in the number of passengers. The experience was that after each drop of this kind a recovery set in, the number of passengers increasing steadily, and ultimately settling down somewhere in the middle between the highest and lowest point of the decline. The revenue did not, therefore, rise in proportion to the increase of fares.

No figures are available for expenditures, but the fact that the street car system, which is owned by the community of Vienna, is still needing a large subsidy, makes it evident that the revenue did not keep pace with expenditure. The following data indicate the ratio of increase of the main items of expenditure and of the revenue, and the relation in which both stand to the depreciation of the currency:

Depreciation of currency.....	1 : 127
Rise of rate of fares.....	1 : 35
Increase of wages.....	1 : 35
Increase in cost of new track.....	1 : 75
Increase in cost of rolling stock.....	1 : 100

REVENUE STILL MEAGER COMPARED WITH OPERATING COSTS

The increment of revenue is not even sufficient to offset the increase of operation cost. The enormously increased cost of maintenance stands, however, quite out of proportion to the present revenue. Although the strictest economy is observed, it is impossible to balance the expenditure. The street car system is a heavy burden on the already overstrained finances of the city, which is finding it very hard to supply the funds necessary for its upkeep. The State Treasury will, therefore, have to come to the rescue, if general conditions do not improve, but of this there is a fair promise. A marked betterment of trade conditions and industrial activity is also noticeable, and the town traffic is consequently picking up. If this improvement continues, the street car system will gradually get back into a healthier condition.



THIS VIEW PROVES THAT THE NEW YORK STATE RAILWAYS, UTICA LINES IS BEHIND THE SAFETY MOVEMENT



WORK IS A PLEASURE IN THIS BRIGHT AND CONVENIENT CORNER IN THE WHEEL SHOP AT UTICA PARK

Shop Notes from Utica

Some Kinks that Have Proved Useful Locally in the New York State Railways' Maintenance Work—Attention to Details Is the Particular Feature Which This Article Aims to Stress—Some Items Mentioned Are a Pinion Puller, a Paint-Spraying Outfit, Jigs for Reclaiming Worn Commutator Segments and a Heater-Coil Winder

THE shops of the New York State Railways at Utica Park, Utica, were recently rehabilitated. The changes were covered in an article by H. S. Sweet, then master mechanic at this point, appearing in the issue of the ELECTRIC RAILWAY JOURNAL for March 20, 1920, page 567. Mr. Sweet showed how a few inexpensive changes had almost doubled the overhauling capacity of the shops. The shops are not only well laid out for their purpose, but in them a number of kinks have been developed which also tend to facilitate maintenance work.

A typical shop corner is shown in one of the photographs reproduced, which features a type of wall gib crane found very useful in the shop. It consists simply of a piece of T-rail hinged to the wall with a guy rod above. The T-rail boom carries a differential hoist,

traveling on a trolley. This corner is in the wheel room and it contains the wheel press and boring mill conveniently placed to facilitate wheel and axle handling.

Another illustration shows a convenient pinion puller, consisting of two links made of steel straps which are hinged on a nut. Through the nut passes a threaded rod with pointed end for centering in the end of the motor axle. When the links are hooked over the pinion and force is applied, the links tend to bind tightly on the pinion and do not slip off. With this device pinion pulling is a very simple operation.

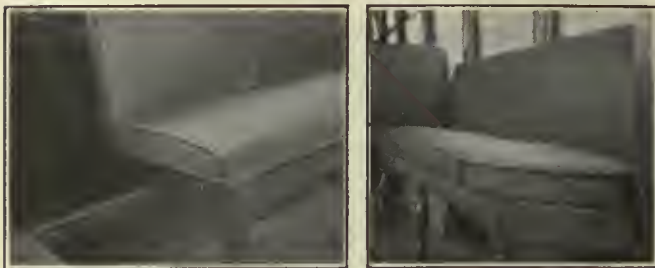
Another time and money saver is a pair of tools used in cutting down worn controller segments to render them available for reuse. The left-hand device shown is a clamp to hold the worn bars and acting as a saw guide during the cutting-off operation. A pin on the



A ONE-MAN PINION PULLER THAT WON'T SLIP OFF AS IT IS TIGHTENED



THIS QUEER LOOKING DEVICE IS A HOME-MADE PAINT-SPRAYING MACHINE



SEAT CUSHION GUARDS WHICH SAVE THE EXPOSED EDGES

inside of the clamping box, not visible in the picture, acts as a stop. The right-hand device is the jig for use in drilling. The construction is similar to the sawing jig except that the clamp is provided with a hardened bushing as a drill guide and there is no base, the device as it stands being very convenient for use in the drill press.

Another useful little device is a motor-driven winding machine, used for winding up heater coils on porcelain cores. The particular feature here is the provision for preventing breakage of the cores by excessive and irregular application of force in clamping. The spindle which carries the porcelain core is supported only at one end, which may for convenience be termed the headstock. At the headstock end of the spindle is a cup-shaped socket to receive one end of the core. The spindle also carries an adjustable clamp on which is mounted a second socket, attached to it by means of a coil spring. When clamped between the two sockets, the core is flexibly but firmly held to the spindle.

HOME-MADE PAINT-SPRAYING DEVICE IS USED IN UTICA SHOPS

As some spray painting is done in the shop, the portable spraying machine shown in another picture is found very useful. This consists of an auxiliary air-brake reservoir mounted on a tiny truck which rolls on old trolley wheels. Air pressure is applied to the reservoir to force the paint to the nozzle where it meets a stream of air supplied from the shop's compressed-air system. The nozzle used in connection with this device is also home made, consisting simply of a short straight piece of $\frac{1}{2}$ -in. gas pipe with another piece entering at the side, stop cocks being inserted in both pipes to control respectively the flow of paint and air.



A WINDING MACHINE FOR HEATER COILS WHICH DOES NOT BREAK THE CORES

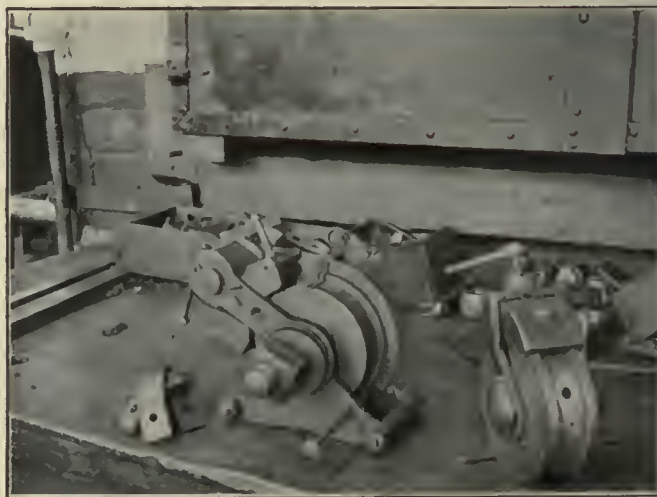
While not exactly a shop matter, the iron cushion guard, shown in two of the illustrations, will be of interest as a product of this shop. On account of the rapid wear of cushion edges exposed to use as foot rests, or located at points where they would be subjected to rubbing, the shop management bent up some $\frac{3}{4}$ -in. rods, flattened out the ends and drilled the resulting guards for convenient attachment to the cushion frame. The result has been a greatly increased cushion life.

The picture at the head of this article is a view taken in front of the carhouse adjoining the Utica shops. It features two items: The enormous safety-first sign, which reaches the eye of the motorman of every car entering the barn; the other is the car in the foreground, which is one of a number remodeled from the open type for front-end center-entrance fare collection. This car, as Kipling would say, "is another story," which was told in last week's issue.

A. S. M. E. Nominations

AT THE MEETING of the American Society of Mechanical Engineers, held in Chicago May 23 to 26, the report of the nominating committee was presented, which, although the nominations must be submitted to the society for letter ballot, may be assumed to represent the choice of the membership.

The list of nominations is as follows: For president, Dexter S. Kimball, dean College of Engineering Cornell University; vice-presidents, Col. E. A. Deeds, Dayton, Ohio; Robert Sibley, McGraw-Hill Company, Inc., San Francisco, Cal., and L. E. Strothman, Milwaukee, Wis.; managers, W. S. Finlay, Jr., New York City, to fill out Dean Kimball's unexpired term as manager, S. F. Jeter, Hartford, Conn.; H. P. Liversidge, Philadelphia, Pa., and Hollis P. Porter, Tulsa, Okla.; for treasurer, Major William H. Wiley, New York City, who has occupied this office for thirty-seven years. To represent the society on the board of the Federated American Engineering Society the following were nominated: Francis Blossom of Sanderson & Porter, New York, N. Y.; Charles A. Booth, Buffalo, N. Y.; Gano Dunn, president J. G. White Engineering Corporation, New York, N. Y.; H. H. Esselstyn, Detroit, Mich.; W. S. Lee, president Piedmont & Northern Railway, Charlotte, N. C.; I. E. Moulthrop, Boston, Mass.; John A. Stevens, Lowell, Mass.; A. E. Walden, Baltimore, Md.; Perley F. Walker, Lawrence, Kan.



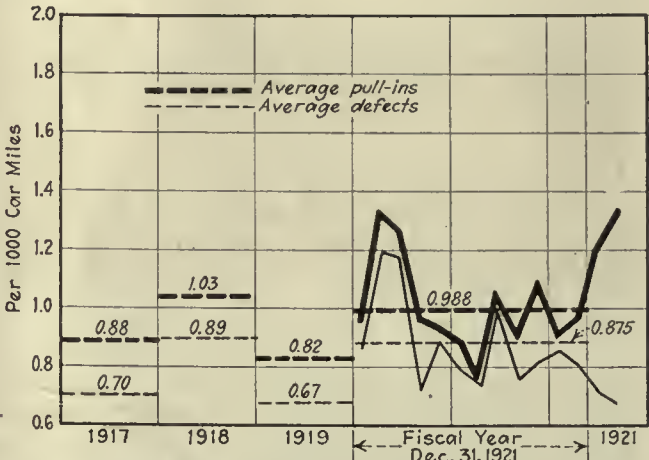
TWO JIGS FOR USE IN RECLAIMING CONTROLLER SEGMENTS

Master Mechanic Proves His Worth

Statistics of Pull-Ins and Car Defects Tell Graphic Story of the Efficiency of the Master Mechanic—
Graph Also Acts as Check on Transportation Department

ON A CERTAIN property, which must necessarily remain unidentified, statistics are kept and recorded graphically for each carhouse with reference to all pull-ins on the basis of number of pull-ins per thousand car-miles and corresponding records of defects are likewise plotted. Curves 1-a and 1-b were taken on this property and indicate graphically the efficiency of a certain master mechanic, "A," who was in charge of both houses. In connection with these two graphs, graph 2 should also be noted, because this is the property to which this particular master mechanic transferred when he left the former property. At the end of 1917, which, as noted, showed a very small number of pull-ins, master mechanic "A" left property No. 1 for a better opportunity at property No. 2. The year 1918 shows a record of pull-ins which is extremely high, and at the end of this year master mechanic "B," as he may be called, was removed to make a place for some one who might have an opportunity to make a better record. Master mechanic "C" was then installed and his record for 1919 speaks for itself, indicating him to be an efficient man. At the end of this year, for some reason, his services were no longer available to the company and he was replaced by master mechanic "D." New equipment was installed in carhouse a. The immediate rise in the pull-in curve of carhouse b is dramatic, and it is pertinent at this point to say that master mechanic "D" was relieved from his duties when this curve reached its peak, master mechanic "E" then coming on and making his presence felt by the immediate drop in this curve.

Returning to master mechanic "A," he entered the employ of the second company at the beginning of 1918. Graph 2 is the record of the principal carhouse of his division, and it is seen that the year 1918 shows a low pull-in record as compared with the previous 1917 record for this house, and that 1919 shows a still lower record. In 1920 this man was promoted to another position in this company, and that the loss of his immediate presence was felt by the division from which he



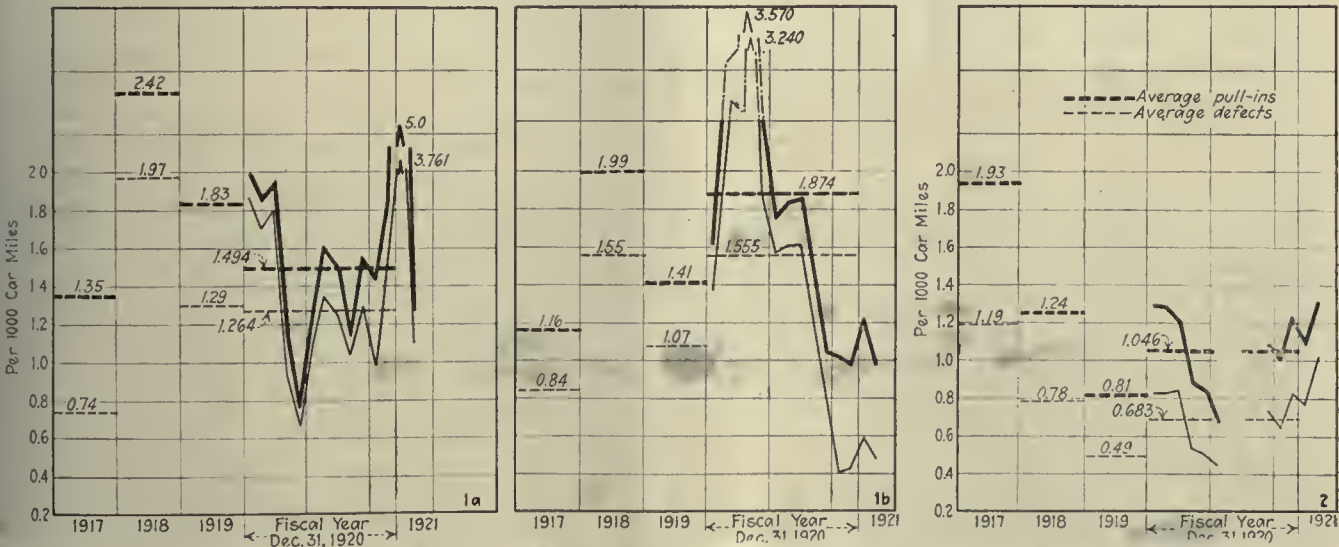
GRAPH SHOWING SPREAD BETWEEN DEFECTS AND PULL-INS AS A CHECK UPON TRANSPORTATION-MECHANICAL DEPARTMENT CO-OPERATION

moved is apparent from the graphical analysis of the pull-ins and defects.

TRANSPORTATION DEPARTMENT ALSO CHECKED

This method of keeping track of these two records of rolling stock also gives an opportunity to note the co-operation which exists between the transportation and mechanical departments. Theoretically, of course, the number of defects per thousand car-miles should coincide with the number of pull-ins per thousand car-miles; in other words, best operation by the transportation department would mean that there should be no pull-ins without cause.

The general management which operates this entire group of properties from which these curves are taken uses this as a basis of check-up on the transportation department with good results. In the single graph shown independently it is noted that toward the end of 1920 the spread between pull-ins and defects commenced to increase to alarming proportions, indicating a very large number of pull-ins where there was no defect. A new superintendent of transportation has been installed on this property with results which the management says amply justify its decision that this spread was due to poor supervision in the transportation department.



GRAPHICAL PORTRAYAL FROM TWO COMPANIES, SHOWING EFFECTIVENESS OF A MASTER MECHANIC WHO PROVED HIS WORTH

Motor Vehicles Must Pay Their Way

Commissioner of Highways of State of Connecticut Says Traffic Benefited by Highway Improvement Should Bear the Cost

AT A NATIONAL highway and traffic conference held at Yale University on May 23 the subject of traffic regulations in streets and on highways was discussed by several prominent leaders. Papers were presented by William Eno, honorary president of the Highway Traffic Association of the State of New York; William J. Bennett, Commissioner of Highways, State of Connecticut; Dean A. N. Johnson, department of engineering of the University of Maryland; Miss Harriet E. Beard, Department of Education, Detroit, Mich., and James W. Inches, Commissioner of Police, Detroit, Mich. There was a general recognition of the increasing problems of regulation of highway traffic and the need of leadership in this line of work. Mr. Eno outlined various traffic regulation schemes which have been placed in operation in various cities all over the world, in order to expedite the traffic. Miss Beard discussed the educational work which was being done in the schools of Detroit with a view to reduction of accidents in traffic. Dean Johnson discussed largely highway construction, and Mr. Inches the Detroit traffic regulation system.

Commissioner Bennett pointed out that there must be somebody, some central organization, to standardize practice and to lead. A highway administrative engineer, he said, must be a student of transportation rather than a technical expert of highways. He must study all kinds of transportation to see how the highways fit into the general scheme and how they should absorb their part of the load. He pointed out that at present there is an overdevelopment of highway traffic in proportion to the total, due largely to the overdevelopment of the vehicle which is used for highway transportation. In other words, there has been a short-sighted direction of capital in so far as the best benefit for the whole public is concerned. Funds have been devoted to the development of a vehicle and thus have not been available to the increasing of necessary rail facilities.

He showed that there are two classes of highway traffic, the first commercial, the second passenger, and that highway construction which will take care of the first will naturally take care of the second. Connecticut itself is in a peculiar situation, for, according to the manufacturers of motor vehicles themselves, 125 miles is the maximum of economical motor vehicle transportation of freight, and Connecticut lies in such a position geographically that it is within this limit of both Boston and New York.

Some of Mr. Bennett's figures are of great interest. Figuring the total cost of operating a certain type of motor truck in Connecticut as \$26.09 per day, 11 cents of this is state tax. If the relative cost of operating this truck on dirt roads and on a hard, smooth surface, such as the state provides, is taken into consideration, it is figured that there will be about \$3 saved in the day's expense by operating on hard smooth roads rather than on dirt roads. If this is turned into a license fee, as is logical, since this is the benefit derived from having the state construct a road, then the fee would be \$750 per year compared to the present \$27.50, figuring a 250-day operation in the year. In Connecticut particularly there is slight local benefit due to hard sur-

face roads, so that traffic which uses the road should bear the cost.

The commissioner said he was not prepared to divide the cost between the two classes, but that a definition was desirable. He did state as a much-emphasized fact that the state should not subsidize commercial traffic on highways, but that it should get enough in fees to pay for the cost of rendering the service to this class of traffic. Commercial traffic on the highways is here to stay and it should pay for the extra service which is given to it.

As to the maximum load which could be carried on motor vehicles, the commissioner was not prepared to say, except that his own view was that 28,000 lb. gross was the greatest load that should be allowed upon improved highways. Of course, it would be physically possible to build a highway for any load, but some economic limit must be set and highways built to that limit. Connecticut now has a new bill, which will probably be passed shortly, the commissioner said, which will limit the truck to such a weight and will also prescribe the weight per inch width of tire and make other regulations as to division of load between forward and rear axles.

Changes in the Cost of Living Since 1914

THE National Industrial Conference Board, New York, has issued another report on cost of living, based on its own figures for retail prices of clothing, furnishings and fuel and the index numbers of the United States Bureau of Labor Statistics with regard to food.

The total increase in the cost of living from the beginning of the war to March, 1921, the investigation shows, was 68.7 per cent. The rise in the cost of the major items of the budget of wage earners between July, 1914, and March, 1921, is estimated to have been as follows: Food, 56 per cent; shelter, 71 per cent; clothing, 74 per cent; fuel and light, 87 per cent; sundries, 85 per cent.

Since July, 1920, the total cost of living has decreased 17.5 per cent. Food has decreased 29 per cent, clothing 35 per cent, while shelter has increased 8 per cent and fuel and light 13 per cent, no change having taken place in the cost of sundries.

Since the beginning of last November the total cost of living has decreased 12.6 per cent, food showing a 19 per cent decrease, clothing a 23 per cent decrease, fuel and light a 6.5 per cent decrease and sundries a 4 per cent decrease.

Electrified Track Switches

WHEN a railway system has more than 40 miles of track and operates between sixty and seventy cars it is either fortunate or very capable in being able to route its cars so that there are only eight switches on the entire system which have to be used in normal operation. Such, however, is the situation on the Little Rock Railway & Electric Company's system in Little Rock, Ark.

Of these eight switches, two have been electrically operated for some time and four are now being equipped with Cheatham switches. The other two may also be equipped in the near future. The management believes, even with the small number of switches it has to operate, that it pays to use electric switches both from a time-saving and a safety standpoint.



THE MONEY BOX IS CHAINED TO THE CHASSIS OF THE TRUCK

Memphis Cash Wagon Defies Hold-Ups

Ford Truck with Triple Locked Strong Box Used to Carry Daily Receipts to Bank, Some Distance Away, in Memphis—Saves Money Over Previous Method of Handling

ACCOMPANYING illustrations give a good idea of the method now employed by the Memphis Street Railway to transfer its daily receipts from the company's headquarters to the bank. As noted, the cash wagon consists of a Ford chassis with a specially constructed heavy truck body, on which truck is placed a very heavy two-compartment iron box built from boiler plate. This iron box is chained to the truck by a heavy log chain, which is securely padlocked to the sides of the chassis. The box has a lower and an upper compartment, each of which is equipped with an iron door, which is padlocked shut. The actual cash is placed in smaller iron box containers about 8 in. x 12 in. x 16 in., which are also padlocked shut. These latter containers are equipped with a sort of harness or carrying ham-mock with handles so that two men can easily carry one of them.

When the truck is loaded with its daily receipts, all padlocks are locked and keys are left in the cashier's office. Three men accompany the truck on its trip to the bank, some distance away from the office, which is at the carhouse out on the system. Another set of keys is kept at the bank, so that the men on the wagon do not have any keys to any of the locks.

The former method of handling this transfer of cash daily in Memphis was to have two men assigned to each of these small iron cash boxes, the whole group of men being sent to town on a special street car. This was

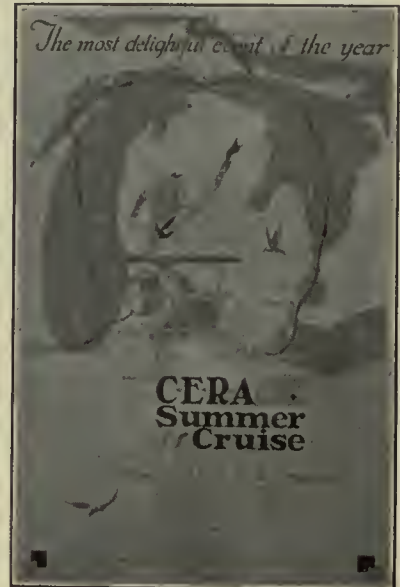
naturally not economical in the use of men's time, for ten boxes needed twenty men to transport them. The company figured that there is a saving of at least \$3 a day by the present method over the former one.

All Aboard for the C. E. R. A. Summer Cruise

THE Central Electric Railway Association committee on arrangements is trying some publicity within the industry in connection with its summer cruise. The accompanying illustration shows one of its 5-in. x 8-in.

poster cards announcing the schedule of the SS. *South American*, which leaves Chicago at 8:30 a.m. on July 26, leaves Toledo on the return trip at 10 a.m. on July 28 and arrives at Chicago at 1 p.m. on Aug. 1.

On the reverse side of this card is a long list of names signed under the motto "We will see you on the boat." The Central Electric Railway Association wants all railway men to take advantage of this summer cruise, the ladies also being welcome. A good program is promised. Reservations are in the hands of John Benham, secretary of the association, 15 South Throop Street, Chicago, Ill.



C. E. R. A. POSTER

"Movie" as Publicity Agent

Many stockholders of the Chicago Railway Equipment Company and their friends were guests of the company recently at an educational film show given at the Woman's Club in St. Louis. More than 6,000 feet of film descriptive of the company's activities made up a portion of the serious part of the entertainment. Originally the company began in St. Louis with one plant, started in 1888. It now has headquarters in Chicago and five subsidiary plants in the East. E. B. Leigh, president of the company, presided and explained the motion pictures.



TWO VIEWS OF THE MEMPHIS CASH WAGON, SHOWING VARIOUS DETAILS

Simple Inspection Method and Record for Small Shop

Adequate System of Keeping Inspection Records Used by the Madison (Wis.) Railways Reduces Amount of Writing or Clerical Work to a Minimum and Without Burdening the Files

A VERY simple though adequate system of keeping the inspection records is used by the Madison (Wis.) Railways. The condition of each car is reported by the motorman who brings it in, and this report is checked by the shop foreman. Most of the trouble reported is taken care of by the night foreman, who also arranges to keep the bad-order cars in the shop during the following day, reporting their condition to the master mechanic. Outside of bad-order reports,

day and turned in to the master mechanic. This record of work done on all cars for the day is then transcribed in the office on an identical card made out individually for each car for the permanent record file. On this the numbers 1 to 30, representing the days of the month, are written in the left-hand column instead of car numbers.

Each card as made up in the form reproduced herewith thus shows at a glance the inspection record for the month of a certain car, the number of which appears in the upper right-hand corner. Thus by inserting in the left-hand column the numbers of cars on which work is done, or the days of the month, the card becomes a record of the inspection for the day on all cars or the inspection for the month on one car. The simple straight-mark system for recording the kind of

17						19						21						32						DATE FEB 1918						
																								RECORD OF CAR NO. 67						
BODY	FLOOR	STEPS	WINDOWS	DOORS	SEATS	WHEELS	JOURNALS	GEARS	TRUCK FRAME	BRAKE CHAINS	BRAKE RIGGING	BRAKE SHOES	TROLLEY WHEEL	TROLLEY STAND	CONTROLLERS	MOTORS	MOTOR-PINION-BEARINGS	SAND	FENDERS	STOVE	LIGHTS	TROLLEY CATCHER	ELECT. BELLS	SCRAPERS	LANTERN-FUSE-LAMPS	HEADLIGHTS				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1	/						/						/					/											169	
2	/												/					/											160	
3	/												/					/											71	
4	/												/					/											169	
5	/												/					/											178	
6	/												/					/											53	
23	/												/					/											27	
24	/												/					/											142	
25	/												/					/											169	
26	/												/					/											142	
27	/												/					/											174	
28	/												/					/											160	
																														948
INSPECTED <input checked="" type="checkbox"/> OILED <input checked="" type="checkbox"/> CLEANED <input checked="" type="checkbox"/> REPAIRED <input checked="" type="checkbox"/> RENEWED <input type="checkbox"/>																														

INSPECTION HISTORY OF ONE CAR FOR ONE MONTH AS KEPT BY MADISON RAILWAYS

the cars are taken in for inspection, adjustment or overhaul in rotation, depending on the mileage operated and the lapse of time since the last inspection. The period of inspection is left to the discretion of the master mechanic, who has full knowledge of every condition.

Owing to the small size of the shop the company does not make use of a printed form of shop order, the master mechanic simply making a pencil report of cars to be inspected and for what cause.

The record system on the inspection work is kept on a 9 $\frac{3}{4}$ -in. x 11-in. card having the divisions of the inspection work printed across the top of the card, together with the account numbers for the several groups, and a key to the inspection record marking at the bottom. Any work done on any car, whether by order or not, is recorded on one of these cards, opposite the car number written in the column at the left-hand margin. A card made up in this manner, with the numbers of all of the cars on which work has been done appearing in the left-hand column, is used each

inspection done reduces the amount of writing or clerical work for the shop man to the minimum. The monthly record for each car gives a sufficiently complete record without too much clerical work and without burdening the files.

New Insulating Varnish

A BLACK insulating varnish, characterized as "General Utility Inco Insulite No. 16," has recently been placed on the market by the International Paint Corporation of St. Louis, Mo. After baking, this varnish produces a hard, semi-flexible, jet-black lustrous coat, possessing a high dielectric strength and electrical resistance, excellent binding and cementing qualities, and practically moisture, acid and alkaline proof. It will air-dry in thin films in from two to four hours at room temperature. When air-dried it produces a semi-gloss black coat more flexible than when baked. It does not, however, have as high dielectric or mechanical strength or as high electrical resistance as when it is baked.

Old Ties Make Good Fence Posts

IN SOME of the recent track reconstruction work in Atlanta it was necessary to take out some old ties, most of which had been gained down by the rail, but were in good condition chemically and physically. Most of these ties have been in the ground for more than twenty years without suffering anything else than physical wear.

Not wishing to scrap good wood like this, it was found that these ties could be made into very good fence posts used for blocking, and these uses have been made of most of the ties removed.

Magnetic Grounding Block

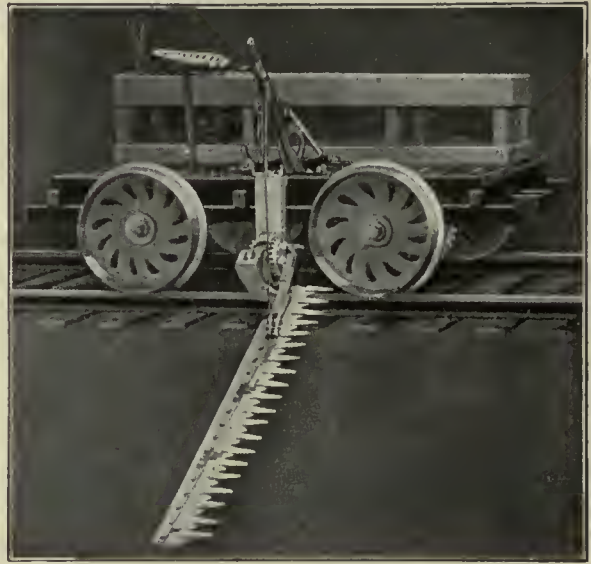
A DEVICE has been developed in England for the purpose of making a good temporary earth or ground connection for track welding and other purposes. It consists of a substantial electro-magnet, provided with carrying handles, the winding being energized with current drawn from the rail. The attraction between the magnet and the rail provides a firm electrical contact between it and the terminal of the electric winding. The device is made by the Equipment & Engineering Company, London.

Mowing the Weeds Along the Tracks

A TRACK mower consisting of an ordinary cutter bar, sickle and driving mechanism which may be attached to any motor, hand or push car and operated by the section men has been placed on the market by the Rawls Machine & Manufacturing Company of Chicago. This mowing device enables the maintenance men to keep the right-of-way well cropped of weeds along either side of the track throughout the summer at a small expense. A cutter bar and sickle from 5 to 7 ft. long is used and is said to negotiate irregularities in the ground without any trouble. The position of the cutter bar is controlled by a hand lever on the car and handled by one man. It is claimed that grass and weeds may be mowed while the car is driven at a speed of 7 or 8 miles per hour. If any obstruction is seen the sickle can be raised to pass over it, and should the obstruction be overlooked there is an automatic feature which protects the sickle from breakage.

The advantage of this device in sections where the grass and weeds grow rank and high along the side of the track and lop over the rails, making them slippery

and dangerous and reducing the normal tractive effort available, is obvious. It is claimed for this track mower that it not only leaves the cut surface smoother than is possible with a hand scythe but it distributes the cut



TRACK MOWER ATTACHED TO SPEEDER

grass and vegetation evenly so that after it has dried the whole surface may be burned over, thus destroying in large measure the stubs and roots beneath and damaging the grass beyond the swathe of the mower.

Vertical Rail Benders

AN ACCOUNT was published on page 809 of the issue of this paper for April 30 of the device used by the Eastern Massachusetts Street Railway for bending up the ends of rails at low joints. Two sizes of benders are used. One is made up of a 15-in. I-beam and is used for heavy work, such as with a 9-in. 104-lb. girder rail. The jack used with this bender is of 30 tons capacity, and a line drawing of this bender was given in the article mentioned. In addition the company has a lighter bender, made up of a 9-in. girder rail and used with T-rails up to 75 lb. in weight. This is also a home-made device.

Through the courtesy of Frank B. Walker, engineer maintenance of way of the company, illustrations of both of these benders in use are given herewith.



AT LEFT, FIFTEEN-INCH VERTICAL RAIL BENDER IN USE. AT RIGHT, NINE-INCH RAIL BENDER USED WITH LIGHT RAILS

Association News

Another View of the Coal Situation

J. W. LIEB, Jr., chairman of the fuel supply committee of the Joint Committee of National Utility Associations, which represents the American Gas Association, the National Electric Light Association and American Electric Railway Association, has received from George Otis Smith, Director of the United States Geological Survey, a letter on the coal situation which is of particular interest to electric railway men. Mr. Otis answers certain questions asked by Mr. Lieb, giving the benefit of the Geological Survey's statistical stock-taking as to coal. He urged the importance of stabilizing the coal market, and stated that April 1 data showed the public utilities to be in a strong position regarding stocks of coal. Continuing he wrote, in part, as follows:

At the present rate of consumption the electric utilities canvassed had on hand as of April 1 a supply sufficient for six weeks, six days' operation, and for the coal-gas plants the supply was enough for nine weeks, three days. As to what the public utilities have been doing since April 1 we have no knowledge. It is clear, however, that consumers as a whole have depleted further their reserves. The country is still coasting on its reserves.

Clearly the public utility operator has everything to gain and nothing to lose by continuing to maintain his reserves. It is increasingly plain that the condition of consumers' stocks has a very profound bearing on the coal market. When a man has a large stock he can wait for favorable terms. When his stock is small he has to buy. If something happens to interrupt the orderly flow of coal from mine to place of use he has to buy emergency coal. Now when stocks are generally low a sudden interruption to supply—a blizzard, a switchmen's strike, a traffic jam—finds many consumers unprepared and drives them to enter the spot market. That is the time when a well-stocked coal bin pays for itself. The plant is equipped to withstand a siege.

We do not know enough about stocks as yet to be quite sure what constitutes a safe supply, but if we are willing to learn from experience we can hardly escape the conclusion that a stock of less than 30,000,000 tons is not sufficient to meet a severe winter with business active. The country entered the winters of 1916-17 and 1917-18 with about 28,000,000 tons in storage and in neither winter was the lot of the coal consumer a happy one. Again in the summer of 1920, when stocks fell to 20,000,000 tons, a runaway market developed. On the other hand, in normal times a stock of above 40,000,000 tons seems to be sufficient and it is significant that the coal market did not tranquilize itself in 1920 until the above-ground reserve passed that figure. A difference of ten or fifteen million tons, the margin between a safe reserve and an unsafe reserve, does not appear much; it is no more than a week's production at the maximum rate. In fact, however, this small amount is great enough to change the tone of the market.

There is a sort of critical level of stocks—a critical anchor-ice temperature, to borrow a phrase from hydro-electric operation. Exactly what the critical level is we cannot say until we have been keeping records longer, and of course it would be lower at a time like the present with business depressed and consumption low than in a time of active business. But we can say, I think, that the critical level lies somewhere between 30,000,000 and 40,000,000 tons; and that when stocks are much above that level we have a "buyers' market." Let them fall much below it and we have a "sellers' market."

As to the present level of stocks the Geological Survey's inventory showed that on Jan. 1, 1921, it was not more than 48,000,000 and not less than 42,000,000, say about 45,000,000 tons. By April 1 stocks had dropped to somewhere near 37,000,000 tons, and since then they have doubtless decreased further. In other words, while we can tell

from the tone of the market that the critical level has not yet been touched, it is plain that stocks are fast approaching it, and that it would be unwise from the consumer's point of view to let them sink much lower.

The question as to the danger of a congestion of transportation should the public long delay the purchase of coal has been answered by the railroads themselves. If business does not revive and we continue to burn coal only at the present rate there is no reason to fear car shortage; for consumption is much below the pre-war level, and prior to the war our transportation system had no serious difficulty in handling the coal offered, even with the peaks and valleys of seasonal variation in demand. In those days, however, the country needed less than 500,000,000 tons of soft coal a year. Now our requirements, with business reasonably active, are in the neighborhood of 530,000,000 tons. There has been no corresponding growth in the capacity of the railroads to transport coal, and on the three occasions when we have called upon them to haul 550,000,000 tons of soft coal in a single year the carriers have shown signs of distress. In 1917, 1918, and again in 1920, years in which the output of bituminous coal exceeded 550,000,000 tons, the carriers were able to handle the burden only by being relieved from the responsibility of carrying other types of traffic. As Mr. Gutheim, of the American Railway Association, has pointed out, "Our railroad facilities are probably adequate today to handle our necessary annual bituminous output, if produced with fair uniformity of rate throughout the year, and will certainly be adequate when post-war rehabilitation of the properties is completed. Our railroad facilities are not and without great waste of investment never can be adequate to handle currently our necessary bituminous coal production when obtained by weekly peaks of 13,000,000 tons and valleys of 7,500,000 tons in a 12-month period, as has been the case in the past two years." If Mr. Gutheim is right the need for buying early and taking coal while it can be had will be with us for some time.

But what, it may be asked, is the use of a public utility storing coal when other consumers are not? How can the tonnage stored by even all the public utilities stabilize the market if other consumers are holding off and burning up their reserves? The answer is that a reserve is never likely to be needed so much as when other people have none.

To offset this sense of security which comes from a large reserve what can the public utility manager gain by delay? To the layman it would appear that no time could be so favorable to bargain as now, when the coal industry is seeking a market for its output. There are three important elements in the cost of coal laid down at the consumer's door which may conceivably change before long—the wage scale, the freight rate, and the operator's margin. So far as the first two are concerned the purchaser should get the benefit on all coal delivered after the reduction. So far as the third element is concerned the public utility must decide whether the coal man is likely to accept any smaller margin later when demand is active than now when the market is dead.

With adequate stocks, however, the public utility is and will be in a strong position to buy whatever the level of costs and whatever the market position of other consumers. The public utility cannot shut down, and the public must pay for the coal the public utility buys, hence from the public standpoint the double function of large stocks: to keep up service and to keep down prices.

Joint Meeting at Hartford

A SUCCESSFUL meeting of the Connecticut Company section of the American Electric Railway Association was held jointly with the New England Street Railway Club at Hartford on May 18. This was the thirty-ninth monthly meeting. Among the speakers were I. A. May, comptroller the Connecticut Company; E. Irvine Rudd, engineer Connecticut Public Utilities Commission; N. J. Scott, manager Hartford Division Connecticut Company; Edward Dana, president New England Street Railway Club and general manager Boston Elevated; W. J. Flickinger, vice-president Connecticut Section New England Street Railway Club and assistant to the president the Connecticut Company; Richard E. Higgins, chairman Connecticut Public Util-

ities Commission, and L. S. Storrs, president the Connecticut Company. The general features of the joint meeting were reported fully in the issue of the ELECTRIC RAILWAY JOURNAL for May 21.

Owing to a reduction in printing costs the association office can now supply the booklet "How You Used to Ride" at \$7.50 per thousand copies. This is the cost price, and the price may be still further reduced if the demand warrants.

Letters to the Editors

Maintenance Cost on a Car-Weight Basis

BROOKLYN RAPID TRANSIT COMPANY

BROOKLYN, N. Y., May 28, 1921.

To the Editors:

David Harum said "a reasonable amount of fleas is good for a dog"; so a reasonable debate on the effect of car weight on track maintenance may not be out of place. The article by J. C. Thirlwall in the April 16 issue of the JOURNAL and subsequent correspondence has created no little interest among track engineers. In the article in the issue for April 30 Mr. Thirlwall evidently does not differentiate his estimated track maintenance costs between city and interurban properties. There is a wide range in maintenance of tracks in these two situations, and in city tracks where paved about 35 per cent of the maintenance cost is for pavements.

The safety car is used almost exclusively in cities where the tracks are paved. Meanwhile there is a large percentage of the pavement maintenance cost which is due solely to the wear and disintegration of the pavement. These are not caused by the passage of the car, no matter of what type it may be, but are only due to use by public vehicles.

As Mr. Thirlwall says, "engineers will disagree as to the effect of car weight on track maintenance," and I venture to be one of the "disagreeers." We do not have sufficient cost data to enable us to determine what it costs to maintain our tracks now, whatever the equipment may be, and I wish to be in opposition to the use of estimates unless the latter have more and better records of actual costs upon which to base estimates of the influence of car weight.

The safety car will continue to sell itself to the railway companies without need for using supposed lessening of track maintenance as an argument. Further, the writer believes that the actual axle load, plus impact, as found with the safety car, does not fall very much below that of other equipment which must be provided for in our tracks and the increase in use of safety cars adds more wheels which pass over the tracks through increased frequency of service. The number of lighter wheel loads, if increased over normal, may do as much total damage to rails and joints as the normal number of heavier loads.

It has also been commonly observed on all older properties which have long used a fairly heavy double-truck car that it is costing a great deal of money to make the "double-truck track" suitable for the single-truck car. A higher degree of maintenance is called for with single-truck cars and is being paid for right now. Until

we know just how much it is costing us to maintain a track almost as smooth as a billiard table, we shall be uncertain that the safety car is saving any money on track maintenance.

R. C. CRAM,
Engineer of Surface Roadway.

A Smile and Credit

THE CONNECTICUT COMPANY

NEW HAVEN, CONN., May 24, 1921.

To the Editors:

What a man wants from his grocer during this period of high cost of living is a smile and credit. Also that is exactly what the street railways want.

Hardly a man will deny that what he wants most nowadays anyway is "a smile." Applied to the street railway situation a smile means the good will of the public and no effort should be spared by officers or by employees in obtaining this good will. It is the most valuable asset a street railway can have and by a proper education of the conductors and motormen the good-will account can be increased to a large extent. One harsh word by a conductor may perhaps make an enemy of one of the road's best customers and booster. A good illustration is given in the following:

"A BANK TELLER'S UNRULY TONGUE"

An old and shabbily dressed man in the line at the receiving teller's window of a certain Chicago bank fumbled for some papers.

"For heaven's sake, hurry up!" snapped the teller.

The old man's eyes flared, he emitted a grunt of anger and left the line without making a deposit.

Twenty minutes later the teller was called into the cashier's office and told his services would be required no longer than the end of the week. He asked for an explanation and got it. The old fellow in the shabby clothes happened to be the head of one of the largest lumber companies in the Middle West—an organization that kept all of its checking accounts in that bank. He had dropped in to make a deposit and open a personal checking account. The amount he intended to deposit was large—the annual dividends from several of his organizations!

After his discourteous treatment by the teller, he had gone to the cashier, and not only refused to have his personal account in the bank, but he had hinted also that his lumber company might withdraw its balance from the bank. The cashier was forced to rid the bank of an undesirable employee who had let his frosty tongue spoil all of his other desirable qualities from the point of view of that banking establishment.

HARRY BOTSFORD, in *Leslie's*.

As for credit, the street railway officials have also forgotten what the word means, but the future is bright and I believe the public begins to realize that it cannot do without the street railways and that it will help to restore credit and thus give a new lease of life to the transportation systems of the country.

With the relief being granted by many legislatures from the unfair burdens of the past and with the riding public paying just fares, the street railways will be restored to a proper credit basis and will give the riding public the service it requires. Let's all vote for a Smile and Credit.

I. A. MAY, Comptroller.

Membership List of International Railway Association

THE International Railway Association, formerly the International Railway Congress, an international organization of steam railroads, has just issued a pamphlet giving a list of members, program for the Rome meeting to be held April 18 to May 1, 1922, index of topics discussed since the association was organized and a brief résumé of recent events.

Recent Happenings in Great Britain

All England Has Been Organized on War-Time Basis to Combat Domination by Coal Miners

(From Our Regular Correspondent)

Unfortunately for the industrial peace in this country, there is a body calling itself the triple alliance. It is a combine for common action of three national trade unions or federations of trade unions, namely, coal miners, railway men and transport workers (the latter including all sorts of transport employees except railway men). The transport workers thus embrace all tramway and omnibus employees, drivers of automobile and horse commercial vehicles, etc., but in this country the word railway does not include street tramway.

EARLY in the present year Parliament, at the instance of the Government, passed an act abolishing all state control of coal mining industry, which had been in operation since the beginning of the war and which otherwise would have continued until Aug. 31. The inflated wages of the miners under state control had to go, and when the mine owners issued new scales of wages, reduced to put the industry on an economic basis—the Government subsidiary being removed—the miners struck in the beginning of April and demanded a national wage board and a national pool of profits so that miners in all districts, rich and poor, would be paid at the same rate.

This action was resisted both by the owners and the Government, but the miners hoped to get the other two sections of the triple alliance to go on strike in sympathy. They announced that they would strike, but at the last minute, on April 15, the two affiliated bodies determined that their men should remain at work. The reasons advanced were that the miners had got a good offer for negotiation, and that the rank and file of railway men and transport workers would in a large proportion of cases refuse to go on strike.

NATIONAL STRIKE AVERTED

Something like a national strike was thus averted. The Government had all preparations made for carrying on transport by road, and the army reserves were called out and a defense force organized for maintaining order. Large bodies of tramway men in different parts of the country had resolved to join in the strike before the counter-order from the transport workers' executive was issued.

During April prolonged negotiations went on between the Government, mine owners, and the miners, and the Government offered a subsidiary of £10,000,000 to help to keep wages up during the ensuing four months of transition. The miners, however, refused all offers, and simply adhered to the demand for a national pool of profits, meaning nationalization. As Parliament had already decided against nationalization the Government persisted in refusing the miners' demand, which was now generally recognized as a political one and having nothing to do with wages.

At the end of April, accordingly, all negotiations were broken off, and the nation settled down to a struggle of

endurance. War conditions of economy were restored. Manufacturing industries were largely shut down for lack of coal, unemployment went up by leaps and bounds, and railway and tramway services underwent a series of successive curtailments. The Government, however, arranged that all public utility services should have a preference in the matter of coal supplies. For domestic purposes coal was rationed and supplies frequently cut off.

With the month of May the reductions in public services continued. Further trouble arose when the executives of transport workers and of the railway men issued orders that the members of these bodies were not to handle imported coal, which was now arriving in considerable quantities. Volunteers and non-union labor were engaged for the work. Meanwhile an important step was taken at several electric generating stations in the country; namely, the adopting of furnaces for oil burning. This was notably the case at Chelsea, the biggest traction power station in the country, which supplies power for the London underground railways. There twenty-four out of the sixty boilers were converted so as to begin operation with oil fuel in the middle of May. Fuel oil supplies are reported to be plentiful, and the change is likely to be permanent.

While town councils in Great Britain have for many years been authorized to own and work tramways and do so in all the large and in some of the smaller towns county councils have not been granted the same privilege. In only comparatively few cases, indeed, is there a field for county councils in this direction, owing to sparseness of population in rural areas and owing to town councils being empowered to operate beyond their boundaries where suburban or interurban population is very dense.

In this connection the London County Council, which works tramways, is a case by itself, for the county of London—all urban—is only a county for certain general administrative purposes. Some years ago the Middlesex and the Hertfordshire County Councils were authorized to construct tramways, but these were leased for operation to a private company. This spring a bold bid for a new departure was made by Durham County Council which applied to Parliament for power to build and work 27 miles of interurban tramways

in the county, to provide and work trackless trolley vehicles on 60 miles of route, and to run omnibuses on any road in the county. The cost of construction and equipment was to be about £1,700,000.

Objection was raised to the establishment of this precedent and to the heavy capital expenditure by a local authority at the present time. It was also maintained that financial loss would result which would have to be met by the ratepayers, and that the scheme was superfluous because private enterprise already provided omnibus services over all except 4 miles of the routes covered by the scheme. Competition with the North Eastern Railway, which pays 12½ per cent of the whole county rates, was also urged. When the bill came before the House of Commons on April 14 it was after discussion rejected by 112 votes against 46.

L. C. C. TRAMWAYS BEHIND

No more disastrous example of the result of high wages and high cost of materials in this country can be found than the case of the London County Council Tramways. The working of the undertaking, which carries more passengers than any other tramway system in this country, resulted in a loss for the financial year ended March 31 last of no less than £540,000. The expenditure debited includes some capital charges, but only half the cost of renewals. Even before the war the system was never a great financial success, largely because of the heavy capital charges for interest and sinking fund on the high cost of the conduit system which for the most part is used. The last increase of fares has greatly increased the receipts, but the higher revenue has proved quite inadequate to meet the growing expenses. The ratepayers are to be charged 1d. in £1 to help to meet the deficiency.

Arthur Watson, general manager of the London & North Western and the Lancashire & Yorkshire Railway Companies, lecturing to the Manchester Statistical Society in April, put forward the view of the most useful development in the methods of transportation would be the electrification of the railways. Restrictive legislation had, however, been passed to such an extent as to interfere with the fundamental principle on which the railway system had been organized; namely, that they were commercial undertakings. Unless reasonable dividends were realized railway enterprise must come to a standstill. Without such dividends it would be impossible to contemplate a large expenditure on the electrification of lines. The capacity of the railways would be enormously increased by the use of electric traction. The country was on the threshold of great electrical development, and the electrification of railways would give a great stimulus to a national system of electrical power production. These opinions of Mr. Watson are quoted as being of special importance, seeing that he is manager of a great railway undertaking.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Publicity Effective

St. Louis Road Succeeds in Driving Home Need for More Liberal Treatment

Publicity relating to the financial problems of the United Railways, St. Louis, Mo., is bearing fruit. Civic organizations in five suburban subdivisions of the city will go before the Missouri Public Service Commission and request that the receiver be permitted to charge an 8-cent fare instead of a 7-cent fare, in order that credit shall be restored and funds obtained to extend several lines.

A recent statement of Receiver Wells made an impression. He said that the fare reduction last year from 8 cents cash, or two tokens on the cars for 15 cents, seven tokens for 50 cents or 50 for \$3.50 at drug stores to a flat 7-cent fare meant an actual reduction of only 37/100 of a cent in fare and yet caused a falling off of about \$3,000 a day in the receipts.

To various bodies of citizens clamoring for extensions of service the receiver has made it plain that the only way to get improvements is to increase the revenue and insure a surplus instead of a deficit. The first three months of this year showed earnings of about \$200,000 less than enough to pay interest charges and operating expenses. Travel has increased slightly the last two months, but the receiver says that if wages are not cut after June 1, when the present contract with the trainmen expires, an increased fare will be necessary.

Conferences are in progress between the men's union and the management over the proposed new wage contract. Motormen and conductors now are getting 55 cents an hour the first six months, 60 cents thereafter until the end of the second year, and 65 cents an hour after two years, with time and a half for overtime based on a nine-hour day. A special effort will be made to modify the working conditions which the management considers a hardship.

The Missouri Supreme Court recently denied the application of the receiver for a mandamus to compel the State Public Service Commission to arbitrate a wage dispute. This arose in the case of the shopmen, electricians, printers and others not belonging to the carmen's union. The court held it was optional with the commission as to whether they should serve as arbitrators. The commission had refused to act in the matter of the shopmen, and whether they will refuse again in case the carmen's claims go to arbitration is not yet known definitely.

In the meantime the receiver and the manager, Col. A. T. Perkins, have met

with various civic organizations to explain the situation, and one of the results is the decision by some of these bodies to support rather than oppose an expected application for increased fare. In one of his statements Receiver Wells brought out the new thought that under the changed condition of utility regulation the users of public utilities must be prepared to pay full value for service.

Threatened Strike Postponed

No agreement regarding wages had been reached on May 31 by trainmen and the Pennsylvania-Ohio Electric Company, Youngstown Municipal Railway and associated companies at Youngstown, Ohio. On that day at midnight the agreement expired, but operation of cars will continue and negotiations proceed at least for a day or two longer. The expiring scale is 60 cents for the first three months, 63 cents for the next nine months and 68 cents thereafter. The company originally offered 45, 48 and 50 cents, and the men after several weeks of negotiations offered to take 52, 55 and 60 cents. The company subsequently proposed a scale calling for 46, 50 and 53 cents. This was the status on May 31.

Utility Act May Strike Snag

The lower house of the Illinois State Legislature on May 25 approved the new public utilities act by a vote of 100 to 23. The bill struck a snag, however, when it was sent to the Senate and a warm fight is promised before its fate is determined.

The proposed law changes the name of the regulating body to "Illinois Commerce Commission." If it passes, the five commissioners on the present body will be succeeded by seven commissioners and eight assistant commissioners, to be appointed by the Governor for a term of four years.

It is said that the bill would remove all civil service safeguards. Communities would have the right to remove themselves from the jurisdiction of the commission and adopt home rule by public referendum. The proposed act has been denounced by various interests including the Western Society of Engineers.

A resolution has been introduced in the Legislature requesting the Governor to prevail on the commission to force a return of the 5-cent fare on the Chicago surface lines. It has been said that this is not favored by Mayor Thompson of Chicago who is looking for the approval of his plan for people's ownership of the traction lines and a 5-cent fare supported by tax provisions.

Des Moines Service Cut

Last Hour Struggle by Business Interests of the City to Preserve Railway to the Community

Following authority granted by Federal Judge Martin J. Wade the General Electric Company, which holds claims against the railway for material supplied, has started removing its equipment from the substations of the Des Moines City Railway with the result that on May 23 the railway officials were forced to cut service 62 per cent of what has been given during the last three months.

As a result the company operated only forty-nine cars from Monday night until Saturday morning when seventeen more cars were placed in service bringing the service up to what was approximately 50 per cent of normal.

Business interests of the city held meetings during the week to discuss ways and means of bringing about a settlement of the railway difficulties. The Greater Des Moines Committee and the Chamber of Commerce appointed a committee to draw a service-at-cost franchise which it is hoped will serve as a basis of bringing about a settlement of the trouble. This committee has since called into conference Judge W. E. Miller, the newly appointed Corporation Counsel to assist it.

Hope is entertained by members of the two organizations fostering the new franchise proposal that if a favorable franchise can be secured arrangements may be made between the Des Moines City Railway and the General Electric Company which will permit the substation to be restored.

F. C. Chambers, operating receiver, and J. G. Gamble, attorney for the railway, have been in Chicago conferring with the Harris interests relative to foreclosure of the mortgage.

According to a Des Moines newspaper the McKinley interests of Illinois, operating the Des Moines Electric Company, have made a proposition for the purchase of the Des Moines plant.

The statement for April filed with the City Council by the railway shows that the company lost \$35,000, a considerable increase over March.

Pending the settlement of the curtailment in the service, negotiations between the company and its union employees over the wage question are at a standstill. As yet the two arbiters chosen by the company and the men have been unable to agree upon a third man. A week ago they settled upon Judge F. F. Faville, of the Iowa Supreme Court, but he was forced to decline. Sidney Mandlebaum was later agreed upon for the third man, but he, too, refused to serve.

Four Months' Labor Battle

Railway at Albany Refuses to Compromise a Strike Issue that It Considers Clear Cut

Renewed attention has been directed to the strike of the employees of the United Traction Company, Albany, N. Y., by the recent disorder there, after a period of comparative quiet. The strike was declared on Jan. 28. The economic readjustment had not yet fully set in at the time, and the men, loath to accept a wage cut, decided to go out in a test of strength in contravention of their contract. In consequence Albany and the entire surrounding communities were thrown into turmoil.

THE pay of the men was increased last July from 45 cents to 60 cents an hour to continue to June 30, 1921, provided the company was allowed the right by the Public Service Commission to increase its rate of fare before Nov. 1, 1920, from 7 cents to 10 cents. The commission did not act upon the application until January, when it granted an increase of fare in Albany from 7 to 8 cents and ordered a decrease in fare in accordance with city franchises in Troy and Rensselaer. The company claims that the net result of the order was an actual reduction in revenue and that it was forced to put the men back on the 45 cents an hour pay to prevent bankruptcy. The company officials insist that the men understood that would be done under the provision in the contract that a general increase in fare be granted before Nov. 1 as a condition for a continuance of the 60 cents an hour pay.

Shortly after the declaration of the strike the company claimed:

1. That under the conditions of operation, wages, prices of material, and rates of fare, it had in six years sustained a loss of \$923,522.

2. That under the decision of the Public Service Commission, effective on Jan. 29, 1921, it estimated its loss for one year, if the rates of pay for motormen were continued at 60 cents an hour (others in proportion), would be \$743,974, and that at the rate of pay of 45 cents an hour, the proposed new rate, its loss for one year would be \$229,096.

3. That the contract between the company and the Amalgamated Association, so far as it covered wages, was ended as of Nov. 1, by the findings in the decision of the Public Service Commission.

Neither the first nor the second of these statements was ever challenged. With respect to the third statement, the Public Service Commission itself said:

That contract (of July 1, 1920,) fixed the wages until Nov. 1, 1920, "with the understanding that said rates of wages are to continue until June 30, 1921, provided the company is granted permission to charge increased rates on or before Nov. 1, 1920." No such permission has been granted, so that there is now no contract covering wages.

The men stuck to their guns, so to speak. Through Supreme Court Justice Howard an order was secured directing that the issues, raised in the application of the union for an order directing the company to proceed to arbitrate the differences, be submitted to a jury. This order was reversed by the Appellate Division, Third Department, on May 17. The decision dismissed the entire proceedings and held that the striking carmen had no claim to arbitration under the contract involved except as to wages for the year

beginning June 30 next. The court also held that the members of the unions "abandoned the contract and committed an anticipatory break of the provision for arbitration by destroying its consideration before it had an opportunity to come into operation." Said the court:

When, on Jan. 28, 1921, the employees of the Traction Company, members of the petitioners' unincorporated association, left their employment, leaving the traction company incapable of immediate performance of its obligations to the public, they committed a breach of the contract, and if there had been a valid agreement for an arbitration of all controversies, they would have relieved the traction company of the obligation to perform. . . . The provision for arbitration is limited. . . . This agreement relates wholly to an adjustment of wages for a period succeeding the term of the contract (June 30, 1921). . . . There was no provision in the contract that the traction company would arbitrate any dispute over wages arising in January, 1921. . . . The election on the part of the employees to abandon their employment in disregard of the contract made in their behalf by the petitioners could not impose an obligation which was not provided in the contract.

Meanwhile the struggle settled down to a real test of strength between the company and its former employees. All the various angles of the ordinary strike entered the controversy, only they became more pronounced as time went on. Even political factions split over the labor issue. Jitneys and omnibuses then poured into Albany, Rensselaer, Troy Cohoes and Watervliet, the five principal cities in which the company operates, and did a rushing business.

For a long time they provided nearly all of the transportation facilities of the entire section and were the cause not only of a long legal fight but of the break in the Republican organization. William Barnes, the Albany County Republican leader, at a Republican dinner in February, urged the public to support the company. He said that it could not continue to pay the increased wages of the men because of its financial condition and that it was to the best interest of the employees to accept the reduction and the public to prevent the company from going into bankruptcy.

Pressure was brought to bear on Mayor James R. Watt to get him to order the jitneys out of business. He refused. The company then secured a mandamus order from Supreme Court Justice Harold J. Hinman directing him to stop the jitneys from running on the ground that they violated the law prohibiting buses from operating on the same streets with trolley lines. That order was upheld by the Appellate Division, and the police began arresting all jitney drivers and bus owners who were

not licensed to run. Out of these arrests grew the recent disorders that at one time apparently threatened to get beyond the bounds of the local police and the State Constabulary to deal with them. Until the issuance of the order forbidding jitneys to carry the people who did not want to ride on the trolleys the strikers and their sympathizers seemingly were content to allow the contest to drag along in the hope that the company might submit or compromise.

The position of the company is that had the questions at issue been dispassionately stated by such a tribunal as the Industrial Commission, had there been a vote thereon with the security and secrecy of the Australian ballot, with an honest count under disinterested authorities, three-quarters, or even one-half, of its former employees would have been found willing to "perform their labor" until the end of June, 1921.

In order that the attitude of the company on the matter might be definitely known, a letter was mailed to each former employee on March 24, last, advising that the company would receive individual applications and that such men as were considered competent and desirable would be employed, with the understanding that the seniority-rights of such employees would begin on the day their applications were accepted; that applications from former employees for their old jobs would be received on and after that date until further notice.

This offer has never been rescinded and is still open to former employees to the extent only however as to such positions as are now vacant as in no event will the men now permanently employed be removed without just cause.

Florida Road Praised

"A Country Banker," writing in the *Saturday Evening Post* for May 21 about his experiences in Florida and elsewhere, said:

The first time I came here, four years ago, the street-car service was in a poor way—cars old and dirty and with a general air of dilapidation. It was owned by a corporation, and that corporation was owned by another corporation. The car line went into bankruptcy and things got worse instead of better, until finally the city took over the plant. It evidently picked out a capable man for manager, and bought new cars throughout, clean and smart-looking and of a type better adapted to traffic conditions here than the old cars had ever been. It rearranged schedules and put the plant in good shape. And now, although it charges only a 6-cent fare, it is making a quite satisfactory showing, and they are laying out some extensions.

Of course I don't know how much of a return on the capital investment a rigid system of bookkeeping would show. But as the city has to provide transportation for a population of 60,000 in winter and only 20,000 in summer the public officials probably figure that a good street-car service which will pay its way is a good investment for the town. The city also operates a gas plant to the general satisfaction of everybody concerned.

The point is that here is an example of successful politics. The city not only performs the usual functions of a city satisfactorily, but also runs a gas plant and a street-car system very satisfactorily.

The city to which he refers is presumably St. Petersburg.

Basis Found for New Orleans Negotiations

C. C. Chappelle, representing the Eastern security holders of the New Orleans Railway & Light Company, New Orleans, La., attended the meeting of the Commission Council on May 25 and submitted his promised scheme of reorganization. Several features of the plan won commendation. It is too much of course to expect that any plan would be acceptable in toto on presentation.

The plan advanced by Mr. Chappelle accepts the rate base valuation of the citizens' advisory committee and assumes \$44,700,000 as a fair valuation of the property for rate-making purposes. As opposed to this there are outstanding capital liabilities of \$71,000,000. The plan provides for an 8 per cent return. Mr. Chappelle argued that this rate of return was essential to secure new capital. Moreover the holders of the senior securities would have to be compensated to relinquish their position of priority. All of the common stock and virtually all of the preferred stock would be wiped out if

an agreement which could be ended by either party on thirty days' notice. The employees finally agreed to remain at work for 48 cents an hour, the old scale, with a yearly agreement the wage clause of which can be terminated on sixty days' notice.

The Ontario Railway & Municipal Board operated the railway for a year, but gave up control on April 30 last, after proving that at the present rate of fares—nine limited and seven unlimited tickets for a quarter—the company cannot meet its obligations, one of which is to pave its share of streets traversed by its lines.

Excursionists Meet with Accidents

About fifty people were injured, a few fatally perhaps, on May 30 when a Pennsylvania freight train crashed into a fast car of the Indianapolis, Columbus & Southern Traction Company, known as the Dixie Flyer, at Edinburg, Ind., where the tracks intersect.

Two Public Service Railway cars collided near Roebling, N. J., on May 30,

Service-at-Cost Agitation Renewed

Operation at service-at-cost for the Dallas (Tex.) Railway has again come to the fore as the new administration of Dallas, which took office on May 2, is considering reopening the question. This issue was one of the chief points on which the recent city campaign was waged.

M. N. Baker, the first supervisor of public utilities under the traction franchise granted to the Strickland-Hobson interests in 1917, has contributed an important chapter in this discussion in a letter written to Lynn B. Milam, who served as supervisor of public utilities under the administration of Mayor Frank Wozencraft. Mr. Baker strongly commends the stand taken by Mr. Milam in favor of the service-at-cost plan, and declares that in such a franchise alone can the city of Dallas expect to find solution for the many problems confronted in the management and supervision of the city's utilities. Mr. Baker also makes reply to the objections to the service-at-cost plan voiced by Mayor Sawnie Aldredge.



LEFT—REMAINS OF CAR IN NEW JERSEY WRECK. RIGHT—DEBRIS SHOWING NEW YORK MISHAP

the plan submitted were followed. It would probably take \$11,500,000 new money to put the company in shape including the sum needed immediately for rehabilitation.

There would be a new company, under a new name, financed largely in New Orleans with a New Orleans man as executive head, and operations to be regulated by the city, with possible representation of the city upon the board of directors.

A scale of rates, to be reduced as the cost of labor, fuel and materials comes down, was promised by Mr. Chappelle.

Wage Contract at London Readjusted

The difficulties between the London (Ont.) Street Railway and its employees have been settled by compromise, and a new agreement has been signed. The men asked for an increase in wages from 48 to 52 cents an hour and a yearly agreement. The company refused the wage increase and proposed

killing one man and injuring about 100 persons. The wreckage took fire. Misunderstanding of orders is believed to have been the cause.

Between fifteen and twenty persons were injured on May 30 in New York City when a Third Avenue Elevated Railroad train bound north with passengers from Staten Island and Brooklyn jumped the track at Westchester and Third Avenues near 149th Street. The first car became uncoupled from the second and went up Westchester Avenue, turning half-way around at Bergen Avenue and blocking north and south-bound tracks. The other cars of the train continued up Third Avenue and smashed a signal tower. When these cars finally came to a stop the second car was left overhanging the elevated structure.

A representative of the Interborough Rapid Transit Company said that the derailling was due to man failure on the part of the motorman. At the point where the wreck occurred there is a spur which connects the elevated road with the subway.

Mr. Baker's letter to Mr. Milam follows in part:

Mr. Aldredge's fears that the supervisory forces of the city will not be able to determine the proper costs are entirely without foundation, as I know, from experience, that the determination of all facts controlling the operation of the railway is a matter which any business man with proper accounting and engineering advice can easily ascertain. There is nothing illusory about the accounting methods of utilities, and with the supervisory powers of the city properly administered the exact status of all revenues and expenses can easily be arrived at.

But, aside from all this, the immediate necessities of the city with reference to improved facilities and extensions of service require that a definite program be developed by any set of city officials who may hold office. It is evident at the present time that transportation development is at a standstill in our city, and that the present franchise, with its limitation of a 5-cent fare, regardless of the cost of operation, has utterly failed and gives no promise for the future.

Of particular interest in this connection are the plans which have been submitted to the city officials of Dallas by the Dallas Railway for the ultimate development of a system of lines touching every part of the city and affording transportation to the maximum number of citizens. These plans were submitted in connection with the com-

pany's application for charter changes, which include the service-at-cost plan of operation with a guaranteed return of 7 per cent on the agreed valuation of property involved in the operation of cars.

In the ultimate development plan numerous changes are contemplated in the existing lines by taking up portions of certain lines and the laying of new lines on other streets. It is proposed to spend \$2,000,000 for improvements within the next five years. A complete map of the city showing all changes proposed has been prepared under Mr. Meriwether's direction and has been presented to Mr. Everman for use of the city in studying the proposed changes.

Power Plant Men Strike in Cincinnati

Plants furnishing power for the Cincinnati (Ohio) Street Railway inclines shut down at 11 p.m. on May 31 when twenty-nine stationary engineers employed by the Ohio Traction Company quit their jobs and walked out. Other power plants supplying current for street railway operation were kept going by men who took the strikers' places. Service will probably be curtailed until the strike is settled, but the public may be sure of day transportation at least.

As for owl service, officials of the company would make no definite promises, saying merely that they "expected to keep the cars going and would do the best we can."

The walk-out followed notice served on officials of the traction company at 10:30 a.m. on Tuesday by Charles B. Manwood, business manager of Stationary Engineers Union, Local No. 18, that all engineers employed by the traction company would go on strike at 11 p.m. Tuesday night unless their wage demands for the coming year were met before that time.

A verbal agreement has existed between the company and the union whereby the men have been receiving 90 cents an hour for the last year. The walkout followed refusal of the traction company to renew the agreement and a suggestion on the part of the company of a cut in wages for the engineers.

W. Kesley Schoepf, president of the railway, and Walter Draper, first vice-president, said that officials of the company met with union representatives on Monday morning in an effort to reach some agreement. They said that the engineers refused to accept the offered wages of 65 and 70 cents an hour, declined an invitation to make a counter proposal entailing any reduction in the wage now paid and turned down all offers on the part of the railway to submit the dispute to arbitration.

Mr. Draper said that the main power houses of the company would be operated regularly and that operation of the inclines would be resumed as soon as the company is sure that it has enough men for the purpose.

Strike Averted in Michigan

Throughout the final days of May continuous efforts were made to reach an adjustment of the wage differences between the employees of the Michigan United Railway and the company, and half an hour before the time set for a strike the controversy was amicably settled with the wage cut as the only new feature of the agreement. During the negotiations it was stated that the wage reduction was to come at the conclusion of the wage agreement which guaranteed a wage scale to last until June 1.

Mayor Frank T. Bennett of Jackson led in the attempts which were made to settle the differences amicably. He at one time obtained a promise from the employees to delay action until members of the Chamber of Commerce had had an opportunity to discuss the question with them.

News Notes

Minnesota Roads All Under State.—All electric railways in Minnesota are now under state control as to rates. Franchises have been surrendered by the Minneapolis & St. Paul Suburban Railway granted by the cities and villages it serves. This is the last company to take advantage of the new law passed by the recent Legislature.

Wage Cut Rejected.—Conductors and motormen at Evansville, Ind., have voted to reject the orders of the company for a wage reduction of 9 cents an hour proposed a few days ago by the head of the Southern Indiana Gas & Electric Light Company. The men are still at work. The scale paid to the men is from 45 to 50 cents an hour on the city lines, and 52 cents an hour for men on the interurban cars, and 54 cents an hour for men working the one-man cars.

Service-at-Cost Suggested at Vancouver.—An agreement is now under consideration by the City Council of Vancouver, B. C., by which the British Columbia Electric Railway would give service at cost, selling four tickets for 25 cents, charges for electric light and gas to remain as at present, and be allowed 6 per cent interest on investments made in the past, and 8 per cent on future investments. At present tickets sell for six for 35 cents; the change would mean an increase of 5 cents for every twelve tickets. Blundell Brown, one of the directors of the company, is at Vancouver from London, England, and is understood to be bending his efforts to inducing the city of Vancouver to take over the system when the franchise expires.

Wages Reduced in Johnstown.—General Manager Shannon of the Johnstown (Pa.) Traction Company has announced a reduction of 5 cents an hour in the wages of the employees. The reduction, effective May 22, affects 450 men.

Buffalo May Have Buses.—The International Railway, Buffalo, N. Y., is considering the advisability of running a bus line in Bailey Avenue until such time as it would be justified financially in laying tracks. The company was granted a franchise to lay tracks and operate cars through the street some years ago, but the time limit has expired.

Wage Reduction Suggested.—Trainmen of the Connecticut Company, New Haven, Conn., all over the State held special meetings during the week ended June 4 for the purpose of hearing the report of their wage committee, which has recently been in conference with officers of the railway. While no official statement is forthcoming, it is understood that the committee will report to its constituents that the company refuses to entertain the proposal to increase wages 25 per cent and in reply counters with a proposal to cut wages 15 per cent. The members of the union will be asked to express their views and issue instructions to the committee with respect to the policy to pursue in the future.

Programs of Meetings

American Railway Association

A business session on June 15 and 16, at the Hotel Drake, Chicago, has been proposed by the general committee of the mechanical division of the American Railway Association instead of the convention that has usually been held at Atlantic City, N. J. The reports of standing and special committees have been considerably modified on account of the limited time allowed for the proposed June session. Reports will be received on the following subjects: "Prices for Labor and Materials," "Car Construction," "Loading Rules," "Brake Shoe and Brake Beam Equipment," "Train Brake and Signal Equipment," "Specifications and Tests for Materials," "Tank Cars," and "Standard Methods of Packing Journal Boxes."

Signal Section—A. R. A.

The annual meeting of the Signal Section, American Railway Association, is to be held at Chicago on June 6, 7 and 8. Committee X presents a report on the requisites of signal locations for automatic block signals. This committee, among other things, will report on automatic train control, and on a proposed short code of requisites for light signals. Committee IV will present a code of instructions for making torque tests of power-operated signals, and a drawing of torque testing apparatus. Committee XV on valuation, J. M. Carley, chairman, will present a report of a dozen pages giving the result of studies in valuation details made by several sub-committees.

Financial and Corporate

Twelve Large Companies Compared

Gross Earnings Increase 17 per Cent, but Expenses 22 per Cent and Operating Ratio 4 per Cent

In the April 16 issue of ELECTRIC RAILWAY JOURNAL, figures from the bureau of information of the American Electric Railway Association were given to show comparative results in 1920 and 1919 from a total of 127 electric railways. Of this total seventy-two were city companies and their gross income exceeded \$233,000,000 in the past calendar year.

An additional interesting comparison may be made with the data from twelve of the largest city properties, the identity of which cannot be made known. These same properties were considered in a review published on page 38 of the issue of July 3, 1920. Their size may be judged from the fact that their gross earnings in the last fiscal year exceeded \$300,000,000 and that they operated one-seventh of the track mileage of the United States. Six of the companies under consideration operate urban surface lines, and the others are rapid transit lines in whole or in part.

The smallest of these properties did an annual business exceeding \$8,000,000 and the average receipts of the twelve were more than \$25,000,000. The pre-

operating ratio averaged 73.8. In 1918 their combined ratio was 60.74.

More service was rendered by each car in the past year on surface lines, the annual miles operated per car averaging 36,565 as against 35,703. The contrary was the case for the rapid transit lines, these figures being 38,440 and 39,200, respectively. The showing as to revenue passengers hauled and revenue car miles operated is not given on a fair basis for the past twelve months because one of the larger properties was split up into several parts which decreased the total for the group of surface lines. As a result the totals for both these items was practically the same as in the preceding year. On the rapid transit lines, however, there was a gain of 11 per cent in number of revenue passengers, while the total of car miles was practically at a standstill. The number of car miles per car hour showed a decrease, evidently due to the fact that the car hours were augmented by contract requirements calling for payment of many "bonus" hours. This item, therefore, is not a true indication of speed performance.

It is impossible to secure a true statements of the total passengers per mile of single track operated because some of the companies, particularly in the rapid transit group, keep no account of transfer or free passengers. However, using the figures as they are pre-

STATISTICS PER CAR-MILE AND PER CAR-HOUR ON TWELVE LARGE ROADS

	Six Surface Lines	Six Rapid Transit
Transportation revenue per car-mile (average)	44.7c.	38.0c.
Expenses and taxes per car-mile (average)	37.6c.	30.6c.
Transportation revenue per car-hour (average)	\$4.00	\$4.63
Expenses and taxes per car-hour (average)	\$3.37	3.70

vailing rates of fare varied, three charging 5 cents; two, 5 cents with a 2 cent transfer charge; one, 6 cents with a 1 cent transfer charge; three, 7 cents; one, 8 cents and two, 10 cents.

Gross earnings of the six large surface companies showed an increase of 17.4 per cent over the previous year, while there was a gain of 21.8 per cent in operating expenses including taxes. For the six rapid transit companies these increases were 17.2 and 22.3 per cent, respectively. The operating ratio for the surface group averaged 87.45 per cent and ranged from 78.26 to 103.38 per cent, whereas the average in the preceding year was 83.06. For the rapid transit group the average was 77.26 against 74 per cent in the previous twelve months, the percentages for the past year ranging from 57.83 to 89.02. The six companies in the latter group would have made a better showing except for the fact that half of them include a large percentage of surface mileage. Taking those which operate subways or elevated lines only, the

sented, there was an increase of 9.4 per cent for surface companies and 4 per cent for rapid transit lines. The number in the former group ranged from 869,223 to 2,381,909, and in the latter from 1,198,190 to 1,603,281, showing plainly the absence of transfer and free passengers from the total.

In these figures, as in the ones given below, the comparison is not entirely fair because five of the companies have a fiscal year ending on June 30, while the others more nearly correspond to the calendar year. The latter class have the advantage of larger earnings from recent increases in rate of fare but on the other hand they were burdened with higher costs due to higher wages starting about the middle of the year.

Puget Sound International Railway & Power Company, Everett Wash.—The Puget Sound International Railway & Power Company will shortly put in operation its Marthas Lake substa-

Baltimore Triples Net

No Dividends Paid on Common Stock
—Surplus Being Put Into the Property

The report of the United Railways & Electric Company, Baltimore, for the year ended Dec. 31, 1920, showed net earnings for the year amounting to \$2.55 per share as compared with 60 cents the previous year. The par value of the stock is \$50. The surplus at the end of the year after making reserve for injuries and damages as well as provision for Federal taxes for the year 1920 amounted to \$1,165,027, or 238 per cent more than the previous year. The accompanying tables give in detail the income and expenses as well as miscellaneous statistical information concerning the year's operation in comparison with the previous year.

SURPLUS GOING INTO PROPERTY

The report calls attention to certain matters as the result of the year's operation.

(1) The company had net earnings during the year of \$1,043,599 after the payment of all operating expenses, taxes, fixed charges and interest including interest on income bonds. The Public Service Commission of Maryland has ruled that it is to the best interest of the public, under existing conditions, that the company should earn a surplus of not less than \$1,000,000 nor more than \$1,500,000 for a year.

(2) The company paid no dividends on its common stock, but put the entire surplus, and in fact the entire amount of the year's depreciation reserve, back into the property. These sums, together with the ordinary maintenance account, aggregated a total sum of approximately \$4,000,000. These expenditures, together with the acquisition of new cars, have created a marked improvement in the physical condition of the property. During the year a new contract was made with the Pennsylvania Water & Power Company for a full supply of power at a cost less than the company could produce power for itself. This enabled the Pratt Street power station to be sold for \$4,000,000, which sum can be used for other capital purposes.

Another interesting item is that the ratio of fixed charges to gross receipts is now 18 per cent as compared with 46 per cent in 1900, which showed that owing to increased receipts the interest charges in 1920 were approximately 18 per cent of gross revenue, as compared with 34 per cent in 1911, and 46 per cent in 1900. During the past two years 41 miles of track have been reconstructed, which is nearly one-sixth of the total amount of trackage within the old city limits. During 1920 there were either built or rebuilt 19 miles of track, of which more than 3 miles represented extensions. During the year the company also abandoned 8.6 miles of old track, which it inherited from the days of duplicated street car service.

There have been added during the year thirty-three one-man front-entrance cars, which have been assigned to the Fremont Avenue line. One hundred double-truck center-entrance trailer cars were also purchased. Car trust certificates as of July 1, 1920 on an 8 per cent basis have been issued for payment of these cars.

All of the one-man front-entrance cars have been in service since July 1 and have demonstrated satisfactory and economical operation, as

INCOME STATEMENT—UNITED RAILWAYS & ELECTRIC COMPANY OF BALTIMORE

Year Ended Dec. 31:	1920	1919	Per Cent Change
Revenue from transportation.....	\$17,196,471	\$14,711,455	16.89
Revenue from other railway operations.....	117,128	82,729	41.49
Total railway operating revenue.....	\$17,313,599	\$14,794,234	17.03
Railway operating expenses:			
Way and structures.....	\$1,004,747	\$915,289	9.77
Equipment.....	1,087,002	919,863	18.17
Power.....	75,738	64,080	18.19
Total maintenance.....	\$2,167,487	\$1,899,232	14.12
Depreciation.....	865,680	739,712	17.03
Power service.....	1,170,404	1,027,846	13.87
Conducting transportation.....	5,465,492	4,898,515	11.57
Traffic.....	12,066	5,262	129.32
General and miscellaneous.....	1,649,712	1,361,383	21.18
Total operating expenses.....	\$11,330,841	\$9,931,950	14.08
Net operating revenue.....	5,982,758	4,862,284	23.20
Taxes, licenses, etc., assignable to railway operation.....	1,839,421	1,409,262	30.52
Operating income.....	\$4,143,337	\$3,453,022	19.99
Non-operating income.....	120,740	40,017	200.97
Gross income.....	\$4,264,077	\$3,493,139	22.07
Deductions:			
Interest on funded debt.....	\$2,030,264	\$1,998,600	1.58
Rents.....	421,384	477,793	11.81
Interest on unfunded debt.....	117,490	93,200	26.06
Interest on income bonds (4%).....	559,157	559,080	0.01
Amortization of discount on funded debt.....	53,068	48,785	8.78
Other amortization items.....	39,115	30,000	23.03
Miscellaneous.....	39,115	39,257	0.36
Total deductions from gross income.....	\$3,220,479	\$3,246,715	0.81
Net income transferred to profit and loss.....	1,043,599	246,424	324.00
Profit and loss surplus at beginning of year.....	345,057	362,370	4.67
Profit and loss credits.....	462,962	342,527	35.20
Gross profit and loss surplus.....	1,851,619	951,322	94.90
Dividends and common stock.....	.....	204,612	.....
Dividends on preferred stock.....	383	920	58.40
Contributions incident to the war.....	.....	23,176	.....
Adjustment of reserve for injuries and damages.....	170,888	225,000	24.00
Provision for uncollectable accounts receivable.....	.....	30,586	.....
Income and excess profits taxes.....	48,008	86,221	43.40
Welfare department deficits.....	.....	31,004	.....
Adjustment items in cancellation of preferred stock.....	6,870	.....	.....
Loss on abandoned equipment of leased road.....	158,327	.....	.....
Engineering and other deferred expenses.....	183,230	.....	.....
Metal tickets and fare boxes.....	45,959	.....	.....
Adjustment account of power contract.....	56,573	.....	.....
Miscellaneous.....	16,354	4,746	244.50
Total profit and loss debits.....	\$686,592	\$606,265	13.25
Profit and loss surplus at end of year.....	\$1,165,027	\$345,057	238.00

Figures in italics show decrease.

well as ability to furnish a much more frequent headway. The results show a net saving through increased receipts due to increased mileage and decreased cost of approximately 30 per cent per year on the investment. The trailer cars are gradually being introduced and are producing economies both in platform labor and power consumption, at the same time reducing the congestion in the business section of the city, as it is obvious that two cars, operated as a unit, are able to pass through the traffic with greater expedition than two cars operated singly. For the purpose of hauling the trailer cars, alterations are being made to 150 double truck-motor cars. These alterations consist of adding vestibules, folding doors and steps, changing platform control, installing

door contacts, lights and signals, as well as a new type of coupling device. The work of vestibuling the double-truck semi-convertible cars is proceeding in accordance with the orders of the Public Service Commission at the rate of six cars per month.

Systematic efforts to reduce accidents showed that notwithstanding the increased car mileage there were 12 per cent fewer accidents than in 1919.

The company has made quite a number of experiments in re-routing of cars and with a service of limiting stops. These experiments have been tried only after an exhaustive study of the situation, which indicated possible favorable results. The public has been most patient with these experiments and should greatly benefit by increased car-

rying facilities and shortening of time spent upon the cars. This, with the co-operation of the Police Department of the City of Baltimore in helping the traffic conditions, has enabled the company to show approximately 11 per cent improvement in the speed of cars.

Appended to the report are graphic charts showing in detail the various operating costs, the receipts and expenditures per car mile and the distribution of gross revenue in fixed charges and various operating expenses on a percentage basis. An organization chart of the various departments is also attached.

Earnings of Ohio Electric Railway Improve

The report of B. H. Jones, receiver for the Ohio Electric Railway system, made to the federal court at Toledo, Ohio, during the week ended April 30, for operations from Jan. 26 to Feb. 28, indicates that under the receivership the group of properties in the system made a substantial gain in earnings over the same period a year ago. The receipts from all sources totalled \$1,130,351. After disbursements a cash balance of \$102,015 was left.

The Indiana, Columbus & Eastern Traction Company, a subsidiary, had a surplus from operations of \$1,346 for the month, compared with a deficit of \$11,344 for the same period in 1920.

The Columbus, Newark & Zanesville Electric Railway had a surplus from operations of \$9,697 for the month compared with a deficit of \$6,895 for the same month a year ago.

The Fort Wayne, Van Wert & Lima Traction Company had an operating surplus of \$588.

The Ohio Electric Railroad, which owns and operates the lines from Toledo to Lima, had an operating deficit for the month amounting to \$9,496 as compared with a deficit of \$18,258 for the same period in 1920.

Refinancing Plans Approved

Stockholders of the Northern Ohio Traction & Light Company, Akron, Ohio, have approved the refinancing plans involving the sale of \$4,548,000 of preferred stock, bringing the capitalization to \$20,000,000 of equal portions common and preferred.

The new stock will be offered to stockholders on either of the following plans: An exchange of two shares of the old 6 per cent preferred for two of the new 7 per cent by buying one share of the new at \$95 and accrued interest, or an exchange of the old for the new by payment of \$10 for each share so exchanged. In either case stockholders must agree not to sell their stock for less than \$95 prior to Jan. 1, 1923. Stock not taken by stockholders will be offered to customers.

The plan for this rearrangement of the capitalization of the company was reviewed at length in the ELECTRIC RAILWAY JOURNAL for April 30, page 829.

STATISTICAL INFORMATION—UNITED RAILWAYS & ELECTRIC COMPANY OF BALTIMORE

	1920	1919	Per Cent Change
Car-miles operated.....	37,162,202	35,522,354	4.62
Revenue passengers.....	253,934,179	243,890,966	4.12
Transfer passengers.....	93,883,660	86,756,575	8.22
Total.....	347,817,839	\$330,647,541	5.20
Operating ratio.....	65.44	67.20	(a) 1.76
Car-mile statistics:			
Operating revenue (cents).....	46.70	41.70	12.00
Operating expenses (cents).....	30.55	28.00	9.10
Net income (cents).....	2.81	0.69	3.07
Total revenue and transfer passengers.....	9.37	9.32	0.54
Car-miles per revenue passenger.....	0.1069	0.1458	(a) 0.0389
Taxes—Per cent of gross revenue.....	10.55	9.50	(a) 1.05
Per cent of net operating revenue.....	30.75	29.00	(a) 1.75
Return earned and common stock (\$50 par).....	\$2.55	\$0.60	324.00
Depreciation reserve:			
Per cent of road and equipment value.....	1.055	0.972	(a) 0.083
Per cent of operating revenue.....	5.00	5.00	.....

(a) Difference.

Answers to Accounting Questions

Another Series of Questions and Tentative Answers Under the Uniform System of Accounts for Electric Railways

Another series of tentative answers to questions raised in connection with the uniform system of accounts, prescribed by the Interstate Commerce Commission, has just been issued. As these answers have not received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission.

THE case numbers covered below are from A-548 to A-563, with certain omissions. Other installments will follow. The omitted numbers represent cases which either are not of sufficient importance to justify publication or involve questions upon which a definite conclusion has not been reached.

Q. (A-548). In track renewal work where the old rail is replaced with heavier rail and untreated ties are replaced with creosoted ties, what accounting should be followed?

A. The excess cost of the improved rails, rail fastenings and ties over the original cost (estimated if not known) of the rails, rail fastenings and ties removed shall be charged to the appropriate road and equipment accounts. The remainder of the expenditures less the value of salvage recovered shall be charged to the appropriate accounts in operating expenses.

Q. (A-550). To what account should be charged the cost of labor cutting grass and weeds on the right-of-way and about trestles and bridges for protection against fire?

A. To account 8, "Track and roadway labor." (See Cases 61 and 319, Accounting Bulletin 14.)

Q. (A-551). To what account should be charged the cost of X-ray apparatus and the expenses of a representative sent to inspect the same before purchase?

A. The cost of the X-ray apparatus, including the cost of inspection, is chargeable to account 538, "Miscellaneous equipment."

Q. (A-552). To what account should be charged rent paid for foreign equipment used for maintenance of way and structures?

A. To account 98, "Rent of equipment." (See Case 274, Accounting Bulletin 14.)

Q. (A-554). To what account should be charged the cost of a waste paper baling machine?

A. To account 538, "Miscellaneous equipment."

Q. (A-555). A carrier issues one-year notes to refund an issue of two-year notes carried in the funded debt account. Should the refunding issue be accounted for as funded debt and the discount treated correspondingly?

A. The face value of the one-year notes shall be credited to account 430, "Loans and notes payable." The discount shall be included in account 420, "Other unadjusted debits," and amortized by monthly charges to account 221, "Interest on unfunded debt."

Q. (A-556). A carrier constructs a track to an industry under agreement that the industry shall advance part of the construction cost and be reimbursed therefor on the basis of cars switched for the industry. What is the correct accounting?

A. The entire construction cost shall be charged to the investment accounts. The amount advanced by the industry shall be credited to account 438, "Other deferred liabilities," and refunds shall be debited thereto as made.

Q. (A-557). When a lessee carrier bears the sinking fund charges of a lessor carrier and meets these charges from proceeds of a bond issue, in whose books should the sinking fund accounts be set up and what accounting should be observed with respect to: (a) Payments as made? (b) Accretions to the fund for interest thereon, etc.? (c) The acquirement of bonds for cancellation and retirement? (d) Discount or premium at which the bonds are purchased? (e) Expenses of the trustee incident to the reacquirement of the bonds? (f) Amounts paid for interest, accrued prior to date of purchase?

A. The lessee shall treat the payments as advances or rent according to the terms of the lease, sinking fund accounts being set up in the books of the lessor with accounting as follows:

(a) As payments are made by the lessee to the sinking fund trustee, the lessor shall debit account 402, "Sinking funds," and credit the lessee or the rent account, as appropriate. If treated as rent, a concurrent entry shall be made debiting account 309, "Appropriations of surplus to sinking fund and other reserves," and crediting account 449, "Sinking fund reserves."

(b) Accretions to the fund for interest, etc., shall be debited to account 402 and credited to account 209, "Income from sinking fund and other reserves," and concurrently account 309 shall be debited, and account 449 credited if the amount thereof is to be held as a part of the reserve. If this, or any other item previously appropriated from surplus, is later used in the reacquirement of the carrier's own bonds for cancellation, account 449 shall be debited and account 448, "Funded debt retired through surplus," shall be credited with the amount expended in the discharge of the principal (less the discount, if any, suffered at time of sale).

(c) When bonds are reacquired for cancellation and retirement account 427, "Funded debt unmatured," shall be debited and account 402 credited with the par value of the bonds.

(d) Concurrent with the entry provided in paragraph (c), account 402 shall be debited and account 306, "Miscellaneous credits," credited with the amount of the discount at which the bonds were purchased, or if acquired at a premium, account 402 shall be credited and account 317, "Miscellaneous debits," debited with the amount of the premium paid.

(e) Expenses of the trustee incident to the reacquirement of bonds such as those for advertising, notary's fees, etc., shall be debited to account 317, "Miscellaneous debits," and credited to account 402.

(f) Amounts paid for interest which accrued prior to the date of purchase by the trustee shall be debited to the account originally credited and credited to account 402; and if accrued interest has been set up in the accounts for the period subsequent to the date of reacquirement an adjusting entry shall be made canceling the same. (See Case 312, Accounting Bulletin 14.)

Q. (A-560). A carrier wrote off to profit and loss in former years the cost of an investigation concerning the advisability of constructing an extension, the project having been abandoned before construction was begun. The same project is now revived and upon basis of the former investigation the extension is made. Is it permissible to restore the former preliminary costs and include them in the cost of the present work?

A. Expenditures for the preliminary investigation shall be included in the cost of the extension and profit and loss credited with the amount previously charged thereto.

Q. (A-561). To what accounts should be charged the cost of hand trucks, miscellaneous hand tools and warehouse scales purchased when an electric carrier begins the handling of freight traffic?

A. The cost of such property is chargeable to account 538, "Miscellaneous equipment," except built-in scales, the cost of which is chargeable to account 524, "Stations, miscellaneous buildings and structures."

Q. (A-562). A carrier sells power to an industry at cost, plus a fixed percentage for fixed charges and return on investment and desires to exclude from its power accounts the cost of the power thus sold. Is it permissible to credit the several power production accounts with the cost of production and revenue account 118, "Power," with the balance?

A. The power furnished the industry shall be accounted for as a sale and the entire proceeds therefrom credited to revenue account 118, "Power," unless the power business is accounted for as an auxiliary operation, in which case account 202, "Auxiliary operations—Revenues," shall be credited.

Q. (A-563). To what account should be charged the cost of dredging to restore depth of water at a dock used for ferry service incident to railway operations?

A. To account 24, "Buildings, fixtures and grounds."

Boston Deficit Being Reduced Gradually

Revenue from direct operation of the Boston (Mass.) Elevated Railway was \$23,003 less during the month of April this year than last, but notwithstanding this handicap the company succeeded in offsetting this loss of revenue and secured a net gain for the month of \$222,134. It is anticipated by the management that if the co-operative efforts are continued the deficit which was so formidable last Fall will soon be only a memory. The outstanding deficit is as follows:

	Deficit	Surplus
Year ended June 30, 1920		\$17,079
Back pay.....	\$435,348	
Six months ended Dec. 31, 1920.....	387,691	
Jan. 1 to May 1, 1921..		536,773
Squantom service and other adjustments.....		34,287
Total.....	\$823,039	\$588,139
Net deficit, May 1, 1921..	\$234,899	

In making this statement of earnings public the following principles, enumerated by the board of trustees in connection with the readjustment of wages, were reiterated:

1. The fact that although a substantial decrease has already taken place in many items affecting the cost of living, that cost is not yet upon any settled basis so that it is peculiarly a fitting time to put in practice the belief of the trustees that to be consistent they should be as deliberate and conservative in following the cost of living when it is upon a downward trend as in following it when it is an upward movement.

2. The fact that they thoroughly appreciate the co-operation that the men have given to the management during the past year which has made possible what would otherwise be impossible in the saving of expenditures amounting to large economies; in other words, the existence of the spirit which has financial as well as other value in the conduct of this service.

3. The fact that as public officials they are in charge of a public business entirely disconnected from any private or competitive industries and that in this attitude they should be careful not to adopt as a standard for the payment of compensation any other rule than that of a full fair wage for work that is earnestly performed.

Further comment by the company follows:

Such consideration carries with it responsibilities. We all have reason to be proud of our work during the past year, but the next twelve months should still further advance our record of efficiency and economy in the interest of the car rider. There must be no idle hours; there must be no waste of material; every move should count.

Co-operation means securing all the revenue, avoiding accidents, being considerate of car riders, helping one another, conserving supplies and materials and not wasting time.

Seattle Far from Being Out of the Woods

According to the monthly report of the Seattle Municipal Railway, \$37,338, or about half the amount needed each month for bond redemption, was set aside in April. Revenues were \$529,109, against \$362,738 expenses, leaving a balance of \$116,371. The balance of \$37,338 is obtained after deducting interest and depreciation. The balance in March was \$32,069. The report said in part:

The report is encouraging, but we are far from being out of the woods. We have not set aside the money for bond redemption, and the interest money has been used to take up outstanding warrant, so that while we have a cash balance of \$98,014 at the end of the month there should be consid-

erably more to meet interest and redemption charges.

The depreciation charge has been made only on the books, the money being used to retire warrants. The light department's annual report, just at hand, shows large expenditures on replacements, financed out of the depreciation fund. The depreciation fund in that department is actual not theoretical.

Customers Offered Stock

\$2,000,000 of Eight per Cent Preferred Issue Placed on Sale in New Jersey

The Public Service Corporation of New Jersey started a campaign on May 23 to sell \$2,000,000 of its 8 per cent cumulative preferred stock to the customers of its three subsidiary companies, Public Service Gas, Public Service Railway, and Public Service Electric Company.

The campaign is under the general direction of R. R. Young, the new business agent. The sales will be made through the employees of the company or directly through the business offices. A partial payment plan will be used, a cash payment of 10 per cent at the time of purchase, and 10 per cent monthly thereafter until the entire pur-

The issue has behind it the credit of Public Service Corporation, the subsidiary companies of which in 1920 did a combined gross business of \$72,318,087, nearly \$35,000,000 more than was done in 1915, and nearly \$45,000,000 more than was done in 1910.

Statistics taken from the last annual report of the corporation give some idea of the magnitude of its transactions. The electric company in its eighteen generating stations produced more than 892,000,000 kw.-hr. in 1920, distributed it over 20,000 miles of wire carried on 176,000 poles or lead through 158 miles of conduit to 234,496 meters. In the same year the gas company produced 16,500,000,000 cu.ft. of gas and distributed it through 3,170 miles of main to 553,343 meters, while the railway carried 453,000,000 passengers and operated its cars a total of 60,798,000 miles.

Financial News Notes

No Provision for Interest on Notes.—No arrangements were made for the payment, exchange or extension of the \$7,750,000 of 7 per cent notes of the Kansas City (Mo.) Railways due on May 15. No interest accruing on them since that due on May 15, 1919, has been paid, and no interest on any of the company's securities has been paid since July 1, 1919. The company has been in receivership since Sept. 9, 1920.

Railway Appoints Purchase Arbitrator.—Formal notice has been received by the city from the Toronto (Ont.) Railway of the appointment of Sir Thomas White as arbitrator for the company on the board to determine the value of the assets to be acquired by the city when the railway is taken over on Sept. 1 next. Sir Thomas stated that he had not met Sir Adam Beck to discuss the name of the third member of the board, who will be chairman. If the two are unable to agree on one person, an application will be made to the courts to designate a chairman of the board.

New Operating Contract Under Negotiation.—Negotiations are under way between the Dallas (Tex.) Railway Company and the Standard Traction Company by which the cars of the Standard Traction Company would be permitted to use the tracks of the Dallas Railway into the business section of the city. The Dallas Railway on May 1 ceased operation of cars on the tracks of the Standard Traction Company, the contract entered into between these two companies having expired. The Dallas Railway at that time said that operation of cars on the tracks of the Standard Traction Company had been continued at a loss and that service could no longer be continued.

"Let Your Service Pay You Dividends"

Public Service Corporation of New Jersey
is offering patrons an opportunity to buy its

3% Cumulative Preferred Stock
On a New "Customer Ownership" Plan

From one to ten shares only—not more than ten—will be sold to any one customer under this new plan

Every share has value behind it and a fixed annual rate of return

In order to place this attractive security within the reach of as many householders and wage-earners as possible, payment for the stock will be accepted in convenient monthly installments. Dividends, computed by patronage, can be made to pay, or help pay, gas and electric bills.

Public Service Corporation of New Jersey, through its subsidiary companies, is furnishing essential utility services to four-fifths of the people of the State. In this year 1920 the operating companies did a gross business of more than \$72,000,000, and the business is steadily increasing.

The new shares sold under the "Customer Ownership" Plan

Public Service Corporation of New Jersey

The "Customer Ownership" Plan affords an opportunity to SAVE and INVEST at the same time without incurring the risks of a highly speculative venture or waiting a number of years for a new enterprise to be developed.

ADVERTISEMENT OFFERING PUBLIC SERVICE STOCK

chase price is paid, being the method of sale. The subscription price is par and accrued dividends. Interest at 6 per cent will be allowed upon money paid in until the entire price has been paid.

The plan marks the start of an entirely new policy on the part of the Corporation. Never before in its history have Public Service securities been offered direct to the public, the method employed heretofore being to sell securities in large lots to investment bankers, who retailed them to the public.

Under the new system of direct sales and partial payment the corporation expects greatly to increase the number of its stockholders among the people who receive its service and thus arouse the interest of its patrons in the company's affairs. Purchasers will become partners in the enterprise with all the rights and privileges, including voting power, that go with the ownership of preferred stock.

Traffic and Transportation

Cincinnati Still Battling

Reduction in Fares May Be Secured by Deferring Collection of Franchise Tax

Following a series of conferences extending over a period of three weeks, participated in by committees representing the city administration, the Cincinnati (Ohio) Street Railway, stockholders, the directors of the company and the Cincinnati (Ohio) Traction Company, assurance has been given that a reduction in fares may be expected Aug. 1, and a still further reduction approximately by Nov. 1. Definite announcement as to this, however, cannot be made until the city indicates its consent to a modification of the franchise ordinance under which the traction company now operates.

The demands of the city are as follows:

1. That improvements of the railway as demanded by the city be made at once.
2. That steps be taken to reduce the prevailing rate of fare as early as possible.
3. That the program concerning the repairing of tracks and streets for 1921 as agreed upon be strictly carried out.
4. That needed repairs on tracks on streets not included in the regular 1921 program be made.
5. That a reduced rate of fare be provided for children of the public and parochial schools.

The Cincinnati Traction Company seems to be in accord with the demands by the committee and a letter was received by members of the committee representing the city administration, signed by W. Kesley Schoepf, president of the Cincinnati Traction Company, in which he said that if financial arrangement could be made he saw no reason why the program could not be carried out.

Mr. Schoepf seeks a postponing or deferring of the collection of the city franchise tax for years 1920 and 1921, saying that the city may reserve the right to make demand for the restoration of all or any portion thereof, as a charge against the company's gross receipts after Jan. 1, 1922. By postponing the payment of this tax, it is believed that it will be legally permissible under the obligations of the service-at-cost franchise to proceed with the reduction of the fare.

The Cincinnati Street Railway has already shown its willingness to assist the Cincinnati Traction Company in getting new capital to make improvements demanded by the city by approving the plan to lend its credit to the extent of \$650,000.

Mr. Schoepf's letter follows in part:

I am prepared to say that this company can meet the views of the city administration in these particulars conditioned upon the following:

1. That the Cincinnati Street Railway will assist the Cincinnati Traction in procuring new capital with which to make the desired and needful improvements. This new capital should not only be sufficient to meet immediate requirements but provide for the future and if possible enable the Cincinnati Traction Company to refund outstanding high rate securities at a lower rate, effecting a reduction in fixed charges on the car rider.

2. That the city of Cincinnati will agree to certain amendments to Ordinance No 253, 1918, to provide:

(A) For deferring or postponing collection of the city franchise tax for 1920 and 1921, the city reserving the right to make demand for restoration of all or any portion thereof, as a charge against the company's gross receipts after January 1, 1921.

(B) For removing the requirements of payments into the reserve fund as provided in Subdivision H. of Paragraph 22 or Ordinance No. 253, 1918, as long as fares are higher than seven and one half cents.

(C) That the city will promptly co-operate with the company in developing a plan for rerouting certain lines, thus relieving congestion and saving unnecessary service and thereby reducing costs of operation at the same time as improving the service rendered.

If these conditions can be met—and I can see no obstacle to their being met—I can reasonably assure you that the desired results can be brought about.

INTERCORPORATE SUIT NOT AFFECTING

Mr. Hornberger, chairman of the city committee, stated he realized the force of the argument as to the deferment of the franchise tax, since the traction company is in no financial position to pay it, but that he was prepared to say that the city would consent to the proposal. The same, he said, was true with reference to the reserve fund.

As to that portion of Mr. Schoepf's letter in which co-operation of the city is sought in developing a plan for rerouting it may be said that the city at all times has been willing to co-operate with the officials of the traction company.

Mr. Schoepf announced that whatever results would be achieved as a result of conferences alluded to, the suit for an accounting now pending against the Cincinnati Traction Company is not involved. There can be no compromise of the questions involved in that suit, Mr. Schoepf said. We will insist that the case be tried in open court and that the company be given an opportunity to prove that the charges and claims made against it in the suit are not true.

Six Cents Not Enough.—A 7-cent fare has been asked by the Little Rock Railway & Electric Company, Little Rock, Ark., in a petition filed with the city clerk to be presented to the Council shortly. The company says a raise from the present 6-cent fare is necessary since the income is just sufficient to meet operating costs. This fare was granted one year ago. The petitioners allege that the company has not paid a dividend since 1918.

More Fares Cut

Advantage of Wage Reduction Passed on to Car Rider by Eastern Massachusetts Company

In accordance with promises made to the public prior to the wage reductions just established, the trustees of the Eastern Massachusetts Street Railway announced reductions in fares on all lines, effective on May 23. In general, these changes in fares took the form of increases in the number of rides sold for one dollar the basic single cash fare of 10 cents still remaining the established unit.

The new rates of fare have been computed as nearly as possible, on the basis of giving the car-riders the entire benefit of the reduced operating expenses which will result from the 12½ per cent cut in pay for trainmen and departmental employees. The decision of the Massachusetts Board of Conciliation and Arbitration, handed down on May 14, made this cut effective retroactively to May 2. When the trustees first proposed to reduce the wage scale they made public announcement of their intention to devote the expected savings to immediate reductions in car-fares.

No official statement of the probable total reductions in payroll as compared with last year has been made, but it is variously estimated at from \$500,000 to \$750,000. During the past year a great many one-man cars have been put into service, and it is proposed to continue increasing this type of service until practically the entire system is operating on a one-man car basis.

The principal changes in fares are shown in the accompanying statement. In a number of cases where several rides are sold for a dollar a rebate of several cents is made in order to induce the passenger to turn in the ticket when it is used up. This is for auditing purposes, as the tickets take the form of a card, on which the conductor punches out one number for each ride.

In the following tabulation the average cost per ride allowing for rebate is shown in parentheses after each ticket group:

LINES NORTH OF BOSTON	
Lowell-Lawrence district:	
Formerly 13 for \$1, with 8c. rebate (7.08c.)	
Now 15 for \$1, with 5c. rebate (6.33c.)	
Haverhill district:	
Formerly no tickets (10c. cash only)	
Now 13 tickets for \$1, no rebate (7.69c.)	
Lynn:	
Formerly 15 for \$1, no rebate (6.67c.)	
Now 17 for \$1, no rebate (5.88c.)	
Salem:	
Formerly 14 for \$1, no rebate (7.14c.)	
Now 15 for \$1, no rebate (6.67c.)	
Melrose-Woburn district:	
Formerly 13 for \$1, with 8c. rebate (7.08c.)	
Now 14 for \$1, with 7c. rebate (6.64c.)	
Boston to Revere, ticket rate unchanged:	
Formerly 15c. cash fare	
Now 10c. cash fare	
Boston to Lynn, ticket rate unchanged:	
Formerly 30c. cash fare	
Now 20c. cash fare	

LINES SOUTH OF BOSTON	
Quincy:	
Formerly 13 for \$1, no rebate, (7.69c.)	
Now 15 for \$1, no rebate, (6.67c.)	
Brookton:	
Formerly 13 for \$1, with 8c. rebate (7.08c.)	
Now 14 for \$1, with 5c. rebate (6.79c.)	

Six Cents Cash in Los Angeles

Continuation of the 5-cent fare by the purchase of ten tokens for 50 cents and the establishment of a 6-cent cash fare for individual rides mark the decision rendered by the California Railroad Commission on June 1 in the case of the Los Angeles Railway. The railway applied for an increase in fare last August and a hearing was conducted in October.

Various improvements in service are ordered by the decision. They include the purchase of 132 additional cars to cost \$1,400,000, the construction of additional carhouses, shops and substations and the making of track improvements, according to press reports.

A copy of the decision had not been received by the Los Angeles Railway up to the time the telegram containing this information had been filed for transmission to the *ELECTRIC RAILWAY JOURNAL* and an official statement was withheld by the management.

The commission estimates that two-thirds of the riders will use tokens and with the other third paying 6 cents and the natural growth in traffic, the company should receive under this arrangement a gross annual revenue of approximately \$10,120,000.

The commission stated in its opinion that the zone system would be impracticable for Los Angeles except as a last resort.

Petition to Prevent Railway Engaging in Bus Business

A fight has been started before the California State Railroad Commission to prevent the Pacific Electric Railway, Los Angeles, Cal., from entering into the automobile stage business in competition with motor passenger cars that use the highways. The Motor Transit Company, which controls and operates a large number of auto stage lines in and out of Los Angeles to surrounding towns served by the electric interurban lines of the Pacific Electric, is the principal opponent in the fight, contending that a motor bus service recently established by the Pacific Electric Railway between San Bernardino and points in the San Bernardino mountains is an illegal enterprise, and has asked the State Railroad Commission to eliminate the electric line as a competitor. According to the Motor Transit Company's petition it also operates a transportation system in the territory covered by the Pacific Electric in the district referred to.

It is stated that the proceedings instituted by the Transit Company are regarded as a test case. The decision of the State Railroad Commission, it is generally agreed, will establish the status of railroads employing motor lines to compete with those already existing.

The establishment of auto stage lines by the Pacific Electric is said to be in line with a policy announced several months ago by the officials of that company, who stated the corporation would be compelled to enter the auto-

mobile transportation business if further inroads into the company's receipts were to be prevented.

Ten-Cent Fare Suburban Lines Last Hope

At the resumption of the hearing on April 26 before the Board of Public Utility Commissioners of New Jersey on the application of the New Jersey & Pennsylvania Traction Corporation, operating between Trenton and Princeton, for an increase in fare from 7 cents to 10 cents in each of four zones between Trenton and Princeton, John J. Treacy, chairman of the commission, remarked that the concern was "harping" upon the fact that a certain amount of money was put in the company and apparently for that reason an increase of fare was expected. In addressing Sidney L. Wright, president of the concern, Commissioner Treacy said:

"Of course you understand, Mr. Wright, that this board can't give you an increase in rates merely because the property owners have put a certain amount of money in the company."

Commissioner Treacy remarked that many other things besides a loss in money to stockholders would have to govern the granting of an increase in rates to a utility company. The commissioner pointed out that operating costs had to be taken into consideration together with wages, cost of power and anything that would tend to make operating costs higher.

Mr. Wright stated that an increase to 10 cents was all that could be expected by the railway, and failing to operate on the increase the company would have to pocket the loss. President Wright admitted to Henry Hartmann, attorney of Trenton, that the 10-cent fare was merely asked for because every other means had been exhausted in an effort to make the company a financial success. Mr. Wright characterized the 10-cent fare application as the concern's "last hope."

One-Man Cars Prohibited

At a recent election the voters of Sacramento decided in favor of an ordinance prohibiting the operation of one-man cars in that city. The Pacific Gas & Electric Company, San Francisco, controls and operates the city lines, but the operating company does not intend to remove the cars from its lines in Sacramento, as they are permitted under the terms of the ordinance to have two men in charge of a one-man car. Therefore, by putting conductors on the cars the company will be within the law. It is apparent that this ordinance was fostered by union forces. It is not stated whether the company will test the constitutionality of the newly passed law.

The New York Transit Commission of New York has made its first report to the Governor. No statement has been made about the contents of the report.

Reduced Fare to Solve Jitney Problem

The Indiana Public Service Commission will reduce the fare of the Indianapolis Street Railway to 5 cents and increase the transfer charge to 2 cents for a period of sixty days, according to a decision reached following a conference with members of the City Council. The Council will order the company to reroute cars in the downtown congested district in an effort to obtain faster schedules and improved service. These measures will be taken in an attempt to enable the company to compete successfully with jitney lines, and if a decrease in "jitney" traffic is not shown at the end of the sixty days, the Council will pass an ordinance regulating the operations of "jitney" lines.

These are the outstanding points of agreements reached at the joint conference which was held in the office of John W. McCardle, chairman of the Public Service Commission, attended by all members of the Council, all members of the commission and Samuel Ashby, city corporation counsel. It was arranged as a result of testimony given the commission by officers of the railway in their petition for relief from operations of jitneys. The order for 5-cent fare and 2-cent transfer charge will be made soon unless some unforeseen event arises to cause reconsideration, Mr. McCardle said.

This appears to be the best solution of the problem of "how to compete with the jitney." Since the inception of the 6-cent fare the jitneys have been doing an enormous business while the result of operation on the Indianapolis Street Railway from April 18 to May 17, 1921, shows a decrease of 851,109 revenue passengers.

Seven Cents in Norfolk

The City Council of Norfolk, Va., has passed an ordinance granting the Virginia Railway & Power Company a 7-cent fare with free transfers until Jan. 1, 1922, unless the granting of a new franchise automatically cancels the temporary rate sooner. The increase was based on a report by Charles E. Ashburner, city manager, who upheld the contention of the officials of the company that its operations are resulting in a net loss, which will force the company into the hands of a receiver unless relieved. The ordinance takes effect thirty days from the date of passage, but it will not be placed in operation until a similar increase on the county lines to be asked by the Virginia Corporation Commission becomes effective. An audit of the company's books, according to Mr. Ashburner, showed a net deficit of \$218,229 for nine months, after deducting net earnings, the depreciation charges, interest on bonds, and payment on guaranteed stock. He estimated a 7-cent fare will increase revenue for nine months by \$251,590, or about \$33,000 more than the money needed to pay the interest charges.

Limited Interurban Bus Service

The Smith-Thompson Transportation Company, Everett, Wash., which when incorporated will be known as the "Interurban Motors Company," has placed orders for six White chassis, which have been delivered, and the bodies are now in course of construction. Four of the cars will be of the type used at present between Olympia and Tacoma, but two will be limited cars, having many new features.

Schedules have been completed which will yield a half hour service between Everett and Seattle, hourly service between Everett and Mt. Vernon by bus and two-hourly service between Everett and Bellingham. Under these conditions seven through connecting trips per day will be made between Bellingham and Seattle each way and the time will be four hours and four minutes. The fare will be nearly \$1 cheaper than the steam road fare for a round trip.

The new service will link up the Northern and the Southern divisions of the Pacific Northwest Traction Company.

Commission Would Have Railway Operate Buses

President Emmons and General Manager Flowers of the United Railways & Electric Company, Baltimore, Md., conferred recently with members of the Public Service Commission on the bus situation. The commission is desirous of having the railway establish bus service in certain sections of the city which do not produce sufficient traffic to justify the laying of tracks for regular trolley service. It is also desired by the commission that the railways establish bus service on East Fayette Street in order that the number of "fly-by-night" machines on that street may be lessened and the traffic concentrated in a company of financial responsibility.

At the same time there was some discussion of taking the blue line buses off Charles Street, which is becoming greatly congested, and transferring them to St. Paul Street, at least as far as North Avenue. These buses are run by the United Railways.

The railway officials are said not to look with favor on the establishment of bus lines as a supplemental service, but President Emmons expressed a desire to go as far as the company's finances would permit in meeting the wishes of the commission. Nothing definite was determined upon at the conference, but Commissioner Whitman stated that he was at work on a plan for handling the bus situation, which will be shown to the railway's officials later.

The jitney business in Baltimore is practically confined to one small line operating cheap buses on East Fayette Street. It would appear to be the thought of the commission to determine whether there is an actual need for this line, and, if so, whether it would not

be profitable to have it operated by the railway, which could be held to more responsible operation than the present private owners.

Transportation News Notes

Fares Remain Ten Cents.—The Mississippi Railroad Commission recently ruled that the Meridian Light & Railway, Meridian, Miss., must retain the 10-cent cash fare in that city. Children's tickets will be 5 cents. The company must issue tickets at the rate of six for 45 cents, each ticket good for one ride and one transfer. The commission's decision will abide for six months.

Council Approves Increase.—The City Council of Flint by a vote of eight to four recently approved a resolution authorizing an increase in fares on the Flint city lines of the Detroit United Railway from 5 to 6 cents. This action was taken on recommendation of a citizens' committee which had made a thorough investigation of the company's request for a higher fare. An examination by Prof. H. E. Riggs of the committee showed that the Flint city lines had been losing money for several years.

Suburban Fare Advanced.—The Dallas (Tex.) Railway has announced an 11-cent fare to Highland Park, which includes the line to Southern Methodist University. The company has been charging only 6 cents to Highland Park, which maintains corporate existence separate from the city of Dallas. A fare of 6 cents will be charged to the city limits of Highland Park, and an additional charge of 5 cents will be collected for those who ride beyond the boundary. It is likely that tickets will be sold to students at the university so that no hardship will be worked on them.

Seven-Cent Fare Sustained.—The Public Service Commission of Pennsylvania has upheld the 7-cent fare on the lines of the Shamokin-Mt. Carmel Transit Company. This finally puts an end to litigation that has extended over a period of four years. The case was started in June, 1917, with the borough of Ashland, the borough of Centralia and the mine locals of Centralia, Mt. Carmel, Kulpmont and Shamokin making the complaints. In its findings, the commission allowed a valuation of \$1,300,000 on the property, and said that the profits of \$56,848 for the year 1920, were not excessive, yielding only 4½ per cent. On June 4, 1917, the company abolished the custom of selling tickets, and substituted in place thereof, a 5-cent cash fare for each zone. On Jan. 15, 1918, the company made a further increase by substituting a 6-cent cash fare in each zone for the

5-cent cash fare. Subsequently the motormen and conductors struck for higher wages and the War Labor Board allowed the men a substantial increase. To meet this increase in wages, the company, raised the fare from 6 cents to 7 cents, which increase went into effect Sept. 26, 1919.

Official Freed of Charge.—New York City Comptroller Charles L. Craig was recently relieved by Judge Manton in the Circuit Court of a contempt charge found by Judge Mayer carrying a sixty-day jail punishment. The charge grew out of a communication between the defendant and Public Service Commissioner Nixon, in which Mr. Craig is said to have asserted that the federal justice prohibited an investigation by the city into the records of the Brooklyn Rapid Transit receiverships. In his findings Judge Manton says: "There is no divinity about the office or duties of a judge which makes him free from criticism. The statute requires a misbehavior which causes an obstruction of the administration of justice."

Company Voluntarily Reduces Fares.—W. J. Harvie, general manager of the Auburn & Syracuse Electric Railroad, Auburn, N. Y., recently announced a fare reduction in Auburn to 7 cents. The company received permission from the Public Service Commission to sell fourteen tickets for \$1 on the city lines and eleven lake tickets for the same amount. The straight fare in Auburn is 8 cents and 10 cents to Owasco Lake. In explaining the voluntary reduction Mr. Harvie said: "The public took the fare increases of the past two or three years in a big way. We have cut the cost of operation by the installation of one-man cars and it is no more than right that the people using the trolley share in this saving." The one-man car system in Auburn was put into effect on May 1. The company has reported that this method has been working out very satisfactorily.

Sustains Seven-Cent Fare.—The city of Fort Wayne, Ind., has lost its fight before the Public Service Commission against the Indiana Service Corporation for a reduction in fares, for the commission has announced the indefinite continuance of the 7-cent cash fare, with four tickets for 25 cents. The present rate of fare was established in the fall of 1920. The city sought a cash fare of 6 cents, or nine tickets for 50 cents. The commission in its order said that for the six months ended March 31 the railway made a return of 8 per cent on its investment, which was said to be \$2,846,358. "This income shows that during the best six months of the year from the street railway standpoint, the months in which the maintenance work is normally the least and the number of revenue passengers the greatest, that the company earned no more than a reasonable return on its investment," the order said. The final conclusion of the commission is that "the petitioner will not earn in excess of a reasonable return under the fares now in effect."

Personal Mention

Mr. Kubu Returns to Cleveland Claims Department

Joseph S. Kubu, for nine years claim agent of the Utica Lines of the New York State Railways, has been appointed assistant superintendent of the accident department of the Cleveland (Ohio) Railway. In accepting the appointment Mr. Kubu returns to old friends and associates in a familiar field, as he had been successively investigator, adjuster and assistant claim agent of the Cleveland Railway before going to Utica in 1912. Mr. Kubu's long experience in claims work, his wide acquaintance with men in this department of public utility service, and an active participation in the work of the American Electric Railway Claims Association led to his election, in 1919, to the position of secretary, which he still holds.

His work with the New York State Railways had been of the highest order and has merited the attention of many traction companies from which he received offers. He had refused all inducements until his old employers made him the proposition of taking charge of their claim department. Mr. Kubu's home is in Cleveland.

Herbert E. Cady, Syracuse, succeeds Mr. Kubu at Utica. He has been assistant to Ansel D. Brown, claim agent for the New York State Railways at Syracuse, and is very popular among the railway officials of both cities.

Messrs. Carmichael and Bucher Promoted

D. C. Carmichael has been elected assistant secretary and E. R. Bucher has been elected assistant treasurer of the Southern Power Company, Charlotte, N. C. Mr. Carmichael and Mr. Bucher will share between them the duties formerly performed by E. C. Marshall, who was elected president of the Southern Public Utilities Company.

Also at the annual meeting of the Mill Power Supply Company Messrs. Carmichael and Bucher were elected secretary and treasurer respectively. W. G. Thomas, who had been manager of the company for the past four years, was made president and manager, succeeding N. A. Cocke as president.

Mr. Carmichael has been with the Southern Power Company for about ten years, serving a considerable part of that period as secretary to W. S. Lee. Mr. Bucher has been with the company since 1905, having been auditor for the company for a number of years past. Both are recognized by the company as young men of splendid qualifications.

The Mill Power Supply Company is the purchasing organization for the

Southern Power Company, the Southern Public Utilities Company, the Piedmont & Northern Railway and other Duke interests in that section.

Steps Up to Managership

H. W. Witherspoon Promoted from Dispatcher to General Superintendent of Stark Electric Railroad

H. W. Witherspoon has been appointed general superintendent of the Stark Electric Railroad, with headquarters at Alliance, Ohio, to succeed M. L. Mowry, who recently resigned.

Mr. Witherspoon is a steam railroad man, having received his early railroad training as a telegraph operator, entering the service of the Pennsylvania Railroad on the Cleveland & Pittsburgh



H. W. WITHERSPOON

Division in 1901. He resigned two years later to enter the employ of the New York Central as an agent and telegraph operator, being promoted to the dispatcher's office late in the year of 1905. After holding the position of chief train dispatcher in 1917 he resigned a year later to become connected with the Stark Electric Railroad.

While in the service of the New York Central Mr. Witherspoon had the honor of being the first train dispatcher to make use of the telephone in dispatching trains on a steam railroad. During his service with that road he contributed much toward the successful use of the telephone in railroad service.

Mr. Witherspoon will have entire charge of the operation of the Stark Electric Railroad Company's property. While his rise from the position of dispatcher to general superintendent is unusual it is certainly evidence of his ability and knowledge of the electric railway field.

The Stark Electric Railroad is an

interurban which operates high-speed passenger and freight service, connecting Canton, Louisville, Alliance and several other Ohio towns. Besides operating a trackage of about thirty-six miles it owns and controls a pleasure park near Alliance.

Arthur W. Senter, superintendent of Division 4, Boston (Mass.) Elevated, left in April for Christiania, Norway, where he will investigate street railway conditions. From there he will proceed to Stockholm, Sweden, covering as many traction properties as possible, arriving home the early part of June.

Harrison Williams was elected chairman of the board of directors and chairman of the executive committee of the North American Company on May 20. As chairman of the board he is acting president. Mr. Williams became a director of the North American Company in June, 1920, when Clarence Dillon, George P. Miller, Edward N. Wells, and Frank L. Dame were also elected to the board of directors.

Walter A. Shaw, for more than seven years engineering member of the Public Utilities Commission of Illinois, has returned to practice as a consulting engineer, with offices in Chicago, Ill. He will give particular attention to public utility rate cases, reports for banks and investors, public utility and industrial management, operation and construction, and all branches of municipal engineering and construction work, including designing and supervision.

H. E. Blain, C. B. E., assistant manager of the London Electric Railway and the Underground group of companies in London, who arrived this week in New York on the Olympic, will be joined by two other officers of his company shortly. These are C. S. Louch, controller and accountant, and J. L. B. Lindsay, assistant secretary to the treasurer. These gentlemen expected to sail from England on May 31 and will join Mr. Blain in New York for a trip of investigation of electric traction matters in this country.

C. H. Evenson and C. E. Jones have been appointed assistants to the general superintendent of transportation of the Chicago Surface Lines. Mr. Evenson is thirty-six years old. He has been connected with transportation companies in Chicago since 1908. For three years he was secretary to the president of the Calumet & South Chicago Railway, and for eight years he was secretary to the president of the Chicago City Railway and the Chicago Surface Lines. In February, 1920, he was transferred to the transportation department. Mr. Jones entered the service of the Chicago City Railway as a gripman in 1882. Three years later he was made a starter and in 1897 he was appointed supervisor. In 1906 he was made an assistant division superintendent and in 1912 was promoted to the position of division superintendent.

New Interests in Detroit United

Frank W. Brooks Has Resigned as President and Alex Dow of the Detroit Edison Has Been Elected a Director

Frank W. Brooks, president of the Detroit United Railway and its subsidiary properties, tendered his resignation as president and member of the board of directors at its meeting on May 25. Alex Dow, president and general manager of the Detroit Edison Company, has been elected to the board of directors. He will represent new Eastern financial interests which have entered the company. Malcolm McIntyre has resigned from the position of night superintendent to accept the appointment as general superintendent of the Mobile (Ala.) Railway.

PRESIDENT BROOKS resigned because of failing health. It was with unanimous expression of regret the resignation was accepted by the directors. Mr. Brooks' successor has not yet been named. He has made no definite plans other than to rest from business affairs.

Owing to Mr. Brooks' failing health the resignation has been expected for some months past, although it was the hope of his associates that he would be able to continue his responsibilities during the present fiscal year. However a more recent development of his

When the Rapid Railway, through financial negotiations, passed into the control of the Detroit United Railway in 1903 Mr. Brooks was made assistant general manager. Within a short time he relieved Jere C. Hutchins, at that time president, of the detailed work of general manager. In February, 1916, Mr. Brooks was elected one of the vice-presidents of the company. In June, 1916, he was made president following the retirement of Mr. Hutchins to become chairman of the board of directors.

MR. DOW FAVORABLY KNOWN LOCALLY

Alex Dow, who has accepted the appointment to the board of directors of the Detroit United Railway, is president and general manager of the Detroit Edison Company and a member of the Detroit Water Board. He has always shown a marked leadership in establishing ideals of public policy, although more directly in connection with the power and lighting utilities than with railways. His ability has been so directed as to instill into the employees of his own company those ideals in such a way as to give a practical demonstration of their working.

It has been principally through Mr. Dow's sound business judgment and through his economic understanding that the Detroit Edison is a company which now represents the consolidation of several others. His policy has been to maintain the property and at the same time pay enough return on the investment so that capital would be attracted. His system of training his men to meet the public in an open-minded way and to believe the customer is right has proved most successful.

Mr. Dow's familiarity with conditions in Detroit mark him as one well able to participate in formulating the future policies of the Detroit United Railway.

After the announcement that he had been appointed to the board Mr. Dow issued the following statement:

I have been asked by Harrison Williams, New York, to serve with him as a director of the Detroit United Railway. He and some friends of his have recently become interested in the Detroit United Railway. Mr. Williams suggested that I could be of help in dealing with the complications of our local street railway service, which he wants to see straightened out as quickly as possible.

J. C. Hutchins, chairman of the board of the Detroit United Railway, tells me that he and the other senior directors will be glad to have me on the board. I have agreed to serve for the present and to continue so long as I am needed, or so long as I find I am working to the common good.

I do not know what will be undertaken first or what part I will be asked to do personally. It looks like real work that I did not seek, but cannot honestly shirk.

Following the announcement of Mr. Brooks' resignation came the news that Malcolm McIntyre had severed his connection with the company to become general superintendent of the Mobile (Ala.) Railway.

Mr. McIntyre became identified with the Detroit United Railway as agent of the Rapid Railway at Algonac in 1903. Later he was appointed foreman at the Canfield carhouse, Mt. Clemens. He was subsequently transferred to Detroit, becoming foreman at the old Clark Avenue carhouse, and then assistant superintendent of the Jefferson line. After serving as superintendent of the Orchard Lake Division he resigned from the Detroit United Railway in 1908 to become general manager of the San Francisco, Napa & Calistoga Railroad.

He returned to Detroit in 1914 and became identified with the Detroit United Railway's consulting engineering department. Later he was made special car agent, then night superintendent of the Detroit city lines. The past few months he has been in the company's schedule department but still retained the title of night superintendent.



F. W. BROOKS



ALEX DOW

physical ailments has required him to surrender his labors with the company.

The career of Mr. Brooks is virtually the history of interurban railway development, especially in the vicinity of Detroit. Mr. Brooks was born in Waco, Texas, March 4, 1865. He was educated in private schools in Waco and was graduated from the Texas State College, where he specialized in engineering. In 1882 he became identified with the construction of the New Orleans & Texas Pacific Railway. In succession he followed his chosen engineering work with the Queen & Crescent Railway and the Louisville, New Orleans & Texas Railway, afterward part of the Illinois Central.

From steam roads Mr. Brooks turned to the field of electric railway construction and operation in 1895, when he became general manager of the Rapid Railway, then under construction and one of the first lines in the country to develop the use of the trolley for the delivery of freight and mail as well as to carry passengers between adjoining communities.

At a meeting planned to be held in New York on June 1 it was proposed to consider problems confronting the company and to fix the scope of Mr. Dow's activities, but at the last minute the meeting was put over until June 3.

As previously indicated the resignation of Mr. Brooks was not unexpected. It is the most important, however, of a series of changes in the operating personnel extending over a period of some months. One of the first officials to resign was Mr. Rifenberick, consulting engineer. He retired in January to start a private consulting engineering practice. Following him W. E. Cann left the company in February to become street railway commissioner at Toledo, Ohio. Changes then occurred in the status of F. W. Brooks, Jr., and E. H. Ives with the company. Mr. Brooks was promoted to assistant to the president and general manager, the position formerly held by Mr. Cann. Mr. Ives then succeeded Mr. Brooks to the office of assistant general superintendent.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Electric Railway Cars Built in 1919 Number 2,352

Census Bureau's Preliminary Figures Show Decrease Over 1914—Also Fewer Steam Passenger Cars

A preliminary statement of the general results of the 1919 census of manufacturers with reference to the construction of steam and electric railroad cars has been issued by the Bureau of the Census, Department of Commerce. Returns were received in 1919 from 121 establishments which manufactured 162,511 steam and electric railroad cars, valued at \$403,517,000, these figures including such cars as were built in railroad repair shops, and as subsidiary products by establishments engaged primarily in other lines of manufacture.

The statistics for 1919 and 1914 are summarized in the following table. These figures are only preliminary and are subject to further change.

CONSTRUCTION OF CARS FOR STEAM AND ELECTRIC RAILROADS

Total cars built:	1919	1914
Number	162,511	137,823
Value	\$403,517,000	\$164,960,000
Steam railroad cars:		
Number	160,159	134,960
Value	\$389,078,000	\$154,797,000
Passenger:		
Number	294	3,568
Value	\$ 5,602,000	\$ 45,245,000
Freight and other:		
Number	159,865	131,392
Value	\$383,476,000	\$109,552,000
Electric railroad cars:		
Number	2,352	2,863
Value	\$ 14,439,000	\$ 10,163,000

Air-Break Circuit Breakers on Short Deliveries

Market Is Improving but Not Due to Electric Railway Buying—Prices Lower in Some Quarters

Although the market for air-break circuit breakers can be characterized as only fair, nevertheless reports from manufacturers indicate a real upward trend in business. In general March has been better than February and April better than March, while May has started out at a still better rate than April. Much of this business, however, has resulted from intensive sales efforts and has not come by any waiting policy. The market presents a spotty tone at times rather than an even flow of business. But the total adds up fairly well, and it is felt that by fall business will have picked up considerably.

A feature of the ordering is the quick shipments that are so often required. Apparently customers have waited till the last moment to order, and generally they have been accommodated. Shipments from factory

stock are commonly made, and up to two weeks is about as long as is necessary to fill a bill. Whole panels using air-break equipment seldom take more than three weeks now. Much of this air-break equipment can be stocked and some manufacturers are working toward this end.

Industrial plant buying is very quiet. Utilities are providing considerable activity, and the same can be said for hotels, apartment houses, etc., for use on either street service or isolated plant lines. For the large station boards there is little market at present. Elec-

tric railway buying both for stations and for substations is reported extremely dull.

Factory operation is well below capacity, probably 50 per cent, and overhead and labor charges are still heavy under these conditions. Raw-material prices are down considerably, it is true, but with labor entering into the breaker cost so materially certain producers have made no change in prices. On the other hand, there have this year been recessions from the peak of from 10 per cent to 25 per cent by certain manufacturers.

Special Trackwork Orders for Repairs

General Situation Quiet, Though One Large Producer Reports Improvement in Electric Railway Buying—Wage Decision Expected to Stimulate Steam Railroad Activity

Although one large producer of special trackwork in the electric railway field reports that orders show quite an improvement recently, the general situation both in the girder and T-rail trackwork markets appears to be quiet. Isolated and concentrated activity in a few sections of the country rather than a general improvement account for the increase in buying noted above. It is true, however, that street railways have been more active than steam railroads in this market of late. Orders, of course, represent pressing repair needs, for the most part, rather than new track extensions. Steam road business remains flat, though signs of an awakening activity are noted in the slightly increasing inquiries that some producers are receiving. The export market is absolutely dead in both fields.

There was a fair amount of girder and T-rail business placed around the first of the year, but since that time buying has held off despite the large potential demand that is existent. Expectations of lower prices, money tightness and need of lower labor costs are factors which have largely been responsible for this. Producers are divided as to whether an increase in demand may be expected later this year. One view holds that as this business is so largely seasonal, conditions will not improve until the spring of 1922. Others, however, are looking forward hopefully to the last quarter of this year.

This latter view finds some confirmation in the decision of the Railroad Labor Board, just announced, making reductions in the scale of pay of railway workers averaging 12 per cent effective July 1. The wages of section men are reduced approximately 18 per

cent, however, and with this impetus to lower track construction costs it is not illogical to expect an increase of steam railroad activity.

Deliveries at the present time are reasonably prompt and do not seem likely to become pushed despite the fact that operation in this field is down to low levels. Special trackwork makers who do not roll their own rails are carrying comparatively low stocks but are able to replenish them as needed for steel mills can furnish rails in six weeks' or less time. Producers are keen for business and with the quality of present competition prices on special trackwork are being shaded. Deliveries of ordinary girder rail work probably average four to six weeks and T-rail orders can be filled with even greater promptness.

Five Million Street Railway Lamps Sold in 1920

Percentage Is Slightly Smaller in 1920 Than in 1919, but Total Sales Are Greater

Sales of street railway lamps in the United States during the year 1920 amounted to 3.2 per cent of the total tungsten filament vacuum type lamps sold. In 1919 the figure was 3.3 per cent and in 1918 it was 3.8 per cent. During 1920, then, of the 161,000,000 vacuum type tungsten filament lamps sold, 5,152,000 must have been street railway lamps. In 1919 about 4,719,000 street railway lamps were sold out of a total of 143,000,000 tungsten filament vacuum type large lamps.

There were 41,000,000 lamps of the gas filled type with tungsten filament sold during the year, bringing the total

tungsten filament lamp sales to 202,000,000. In addition 9,000,000 carbon lamps were sold in 1920. Carbon sales now represent only 4½ per cent of total large lamp sales. In 1919 it was about 7 per cent. The preceding figures were taken from the report of the lamp committee before the National Electric Light Association in convention at Chicago this week.

Prompt Shipments Rule for Carbon Brushes

Buying of Brushes by Traction Interests Is Still Light and Stocks Are Not Being Built Up There

Manufacturers of carbon brushes quite uniformly report a quiet market for their product this spring. With industrial operation at its present low point in so many lines of activity throughout the country fewer motors are being run and fewer brushes are being bought. On the other hand, in certain lines, such as the steel industry, opportunity is being taken of slack production to overhaul electrical equipment, and there the demand for replacement brushes holds up fairly well. Electric railways are not endeavoring to carry surplus stocks, and their buying is of the hand-to-mouth order. Central-station companies at the present time are buying most nearly to their normal requirements.

There are signs of better business ahead, however; in fact, in certain quarters it is stated that the carbon-brush business in May represented an improvement over the previous three months. Producers as a rule are proceeding cautiously, nevertheless, on the supposition that the next few months

may be lean ones. Production is down to 50 to 75 per cent of capacity, inventories being reduced accordingly.

Stocks of the semi-finished products are in ample shape to take care of customers, however, and shipments at present are very prompt. Prices are still at their peak except with one producer who is selling brushes at their present replacement cost, and this, it is stated, figures about a 10 per cent reduction. Other manufacturers are quoting on a price basis which has remained constant since the end of 1918.

\$1,400,000 in Cars for Los Angeles

In a decision rendered June 1 fixing the fares for the Los Angeles (Cal.) Railway, the Railroad Commission of California has ordered various improvements in service. Included among these is the purchase of 132 additional cars to cost \$1,400,000.

Large Fare Register Order Placed

The Philadelphia Rapid Transit Company has placed an order with the International Register Company for 2,654 single-dial registers of the R-7 type. The railway already has 2,900 registers of this type in use and the new order will bring the total number on this property up to over 5,500. The new registers will be installed on cars already equipped with cash fare registers, for the purpose of recording tickets as well. A second register was placed on each car rather than discard those already in use and substitute a double-dial register. Of the registers already in use in Philadelphia 350 were purchased in 1901 and 1902 and 2,200 in 1908 and 1909.

Rolling Stock

Pacific Northwest Traction Company, Everett, Wash., will replace all old-type cars on its lines in that city with new Birney safety cars. Several cars have been replaced and others will be added in the near future.

Track and Roadway

Ontario Power Commission, Ontario, Can. — The town of Walkerville will not press the Ontario Power Commission for any new lines on Ottawa Street and Monmouth Road as planned. By waiting a year Councillor Calderwood says the commission can save the municipalities many thousands of dollars in construction costs.

Union Traction Company, Anderson, Ind.—The Union Traction Company of Indiana has begun improvements in its track through Hartford City, Ind. The cost will be \$10,000.

Boston & Eastern Electric Railroad, Boston, Mass.—The Committee on Railroads gave a hearing recently on the petition of the Boston & Eastern Electric Railroad for extension of time to April, 1924, to build and operate the railway and tunnels which were provided in the act incorporating the company in 1911. There was no opposition to the hearing.

Nuevo Laredo, Mexico.—Contract for reconstruction of the railway lines in Nuevo Laredo, Mexico, just across the Rio Grande from Laredo, Tex., has been awarded by Luis Barreda, president of the company, to H. R. Mason, of Laredo.

NEW YORK METAL MARKET PRICES

	May 4, 1921	June 1, 1921
Copper ingots, cents per lb.....	12.62½	13.25
Copper wire base, cents per lb.....	14.50	15.00-15.25
Lead, cents per lb.....	4.75	5.00
Nickel, cents per lb.....	41.00	41.00
Zinc, cents per lb.....	5.45	5.20
Tin, cents per lb.....	31.87½	31.50
Aluminum, 98 to 99 per cent, cents per lb....	28.60	28.00

OLD METAL PRICES—NEW YORK

	May 4, 1921	June 1, 1921
Heavy copper, cents per lb.....	10.00 to 10.50	10.75 to 11.00
Light copper, cents per lb.....	7.50 to 8.00	8.25 to 8.37½
Heavy brass, cents per lb.....	5.50 to 5.75	5.25 to 5.50
Zinc, old scrap, cents per lb.....	2.87 to 3.00	2.50 to 2.75
Yellow brass, cents per lb.....	3.75 to 4.00	4.00 to 4.50
Lead, heavy, cents per lb.....	3.75 to 3.90	4.25 to 4.50
Steel car axles, Chicago, per net ton.....	14.00 to 14.50	14.50 to 15.00
Old car wheels, Chicago, per gross ton...	13.50 to 14.00	13.50 to 14.00
Steel rails (short) Chicago, per gross ton...	13.00 to 13.50	14.00 to 15.00
Steel rails (rerolling), Chicago, gross ton..	12.50 to 13.00	13.50 to 14.00
Machine shop turnings, Chicago, net ton..	5.00 to 5.50	3.50 to 4.50

ELECTRIC RAILWAY MATERIAL PRICES

	May 4, 1921	June 1, 1921
Rubber-covered wire base, New York, cents per lb.....	16.00	16.00
Weatherproof wire base New York, cents per lb.....	15.50	15.50
Standard Bessemer Steel Rails, per gross ton.....	45.00	45.00
Standard open hearth rails, per gross ton..	47.00	47.00
T-rail, high (Shanghai), per gross ton, f.o.b. mill.....	.....	.....
Rails, girder (grooved), per gross ton, f.o.b. mill.....	.....	.....
Wire nails, Pittsburgh, cents per lb.....	3.25	3.25
Railroad spikes, drive, Pittsburgh base, cents per lb.....	3.40	3.40
Tie plates (flat type), cents per lb.....	2.75	2.75
Tie plates (brace type), cents per lb.....	2.75	2.75
Tie rods, Pittsburgh base, cents per lb....	6.00	5.50
Fish plates, cents per lb.....	2.75	2.75
Angle bars, cents per lb.....	2.75	2.75
Rail bolts and nuts, Pittsburgh base, cents per lb.....	4.50	4.50
Steel bars, Pittsburgh, cents per lb.....	2.10	2.10
Sheet iron, black (24 gage), Pittsburgh, cents per lb.....	3.85	3.85
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.....	4.55	4.55
Galvanized barbed wire, Pittsburgh, cents per lb.....	4.10	4.10

	May 4, 1921	June 1, 1921
Galvanized wire, ordinary, Pittsburgh, cents per lb.....	3.70	3.70
Car window glass (single strength), first three brackets, A quality, New York, discount.....	82%	82%
Car window glass (single strength), first three brackets, B quality, New York, discount.....	82%	82%
Car window glass (double strength, all sizes, A quality), New York, discount...	83%	83%
Waste, wool, cents per lb.....	11 to 17	11 to 17
Waste, cotton (100 lb. bale), cents per lb. White.....	9.00 to 13.00	9.00 to 14.00
C.I. red.....	7.00 to 11.00	6.50 to 12.00
Asphalt, hot (150 tons minimum), per ton delivered.....	33.00 to 35.00	33.00 to 35.00
Asphalt, cold (150 tons minimum, pkgs. weighed in), per ton.....	33.00 to 36.00	33.00 to 36.00
Asphalt, filler, per ton.....	36.00	36.00
Cement, New York, per bbl.....	3.20	3.20
Linseed oil (raw, 5 bbl. lots), New York, per gal.....	.63	.78
Linseed oil (boiled, 5 bbl. lots), New York, per gal.....	.65	.80
White lead (100 lb. keg), New York, cents per lb.....	.13	.13
Turpentine (bbl. lots), New York, per gal.....	.67 to .68	.65

* These prices are f.o.b. works, with boxing charges extra.

The street car tracks were partly torn up and the electric plant put out of commission by Huertistas in 1914 and the street cars of the Mexican city have not been operated since that time. The lines will be rebuilt and power plant and rolling stock put in first-class condition, it is announced.

Public Service Railway, Newark, N. J.—The Public Service Railway will pay \$1,500 as its share of the proposed improvement of Belmont Avenue, Paterson, with the understanding that the company will be relieved of any further responsibility this year. The Board of Freeholders will probably take final action shortly so that bids can be solicited for the contract and the improvement begun as soon as possible.

International Railway, Buffalo, New York.—The International Railway has agreed to undertake almost \$1,000,000 worth of track improvements in Buffalo immediately. There will be no extensions under the program already outlined.

Southern Public Utilities Company, Charlotte, N. C.—The Southern Public Utilities Company will superintend the laying of car track in connection with the plans of the Charlotte Construction Company to include a loop of about one mile over an area that is expected to be built up shortly with modern residences. This plan for extending the car line that now ends on East Boulevard, Dilworth, to include the above-mentioned loop and acquisition of about eighty more lots in Dilworth by the Dilworth Building Company was announced recently by E. D. Latta, of the Charlotte Construction Company, and T. T. Cole, of the Dilworth Building Company.

Kitchener, Ont.—The Kitchener Light Commission announced that the street car service will be extended to the eastern limit of the city. The commission will double-track the right-of-way some time this year.

Toronto, Ont.—The Private Bills Committee of the Ontario Government passed a bill recently permitting the city to install a cable for the civic railway at a cost of \$31,650.

Philadelphia (Pa.) Rapid Transit Company.—The Philadelphia Rapid Transit Company will establish a new line on Forty-second Street from Chester Avenue to Market Street. The line will replace the Hog Island line which was discontinued when the Hog Island shipyard closed.

Dallas (Tex.) Railway.—The Dallas Railway so far has not given its approval to plans offered for relieving traffic on Main Street by taking cars off this street and rerouting them on other streets. A majority of the board of city commissioners has expressed approval of the plan and the City Plan Commission has recommended that the tracks be removed from Main Street. The Dallas Railway, however, has planned to keep its tracks on Main Street as far east as Preston Street.

Galveston (Tex.) Electric Company.—The Galveston Electric Company, which owns and operates the car lines in Galveston, has been asked in a resolution adopted by the City Commission to consider the building of an extension to serve that portion of the city known as the "West End," which includes all that portion of the waterfront and industrial district back of the wharf west of Thirty-third Street. This district could be served, it is pointed out, by the construction of a line from Broadway at Forty-first Street to Avenue G, then on Avenue G to Forty-fifth Street. Raymond G. Carroll, general manager of the Galveston Electric Company, has expressed approval of the proposed extension, declaring that he believes the service can be provided at a cost of little more than \$10,000.

Wichita Falls (Tex.) Traction Company.—The Wichita Falls Traction Company announces that it soon will build another extension besides the one out Indiana Street mentioned in the ELECTRIC RAILWAY JOURNAL for May 7, but the routing of the second line has not been determined upon. Announcement that these lines would be built was made with the request for withdrawal of application for franchise for another contemplated line. The improvements will represent an outlay of approximately \$100,000.

Power Houses, Shops and Buildings

Petaluma & Santa Rosa Railroad, Petaluma, Cal.—The Petaluma & Santa Rosa Railroad is installing a 300-hp. motor generator set, automatic in its operation. It is situated at the top of the grade out of Petaluma at Stony Point and is to be used in assisting heavy freight trains over the hill.

Professional Note

Allan V. Garratt, hydraulic engineer, has opened an office at 176 Federal St., Boston, Mass., for consultation and advisory work. Mr. Garratt was formerly chief engineer of the Lombard Governor Company and more recently consulting hydraulic engineer to Lockwood, Greene & Company, engineers.

Trade Notes

The Exeter Machine Works, Inc., West Pittston, Pa., has recently placed on the market a new "Exeter" rotary pump (Feuerheerd Patents):

The Automatic Boiler Cleaner Company, New Orleans, La., has placed on the market a mechanical boiler cleaner for any type and size of boiler.

C. H. Wheeler Manufacturing Company, Philadelphia, Pa., manufacturer of condensers, pumps, cooling towers, etc., is opening a new branch office in Boston on June 1 at 53 State Street, Room 613.

Standard Underground Cable Company, Pittsburgh, announces its purchase of a 12-acre tract in St. Louis on which in the near future a large plant is to be erected for the manufacture of cable and other forms of insulated wire, supplementing its four other factories. A million-dollar addition is now being made to its plant in Pittsburgh.

Pacific Clay Products Company, American Bank Building, Los Angeles, Cal., will start work on a new factory at Los Nietos for the manufacture of firebrick and refractory shapes. Larger capacity will be available than in the old plant which was recently destroyed by fire, and it is expected this will be absorbed by distribution on the West Coast.

The Steel Fabricating Corporation, manufacturer of Stefeo readybuilt steel buildings, announces the completion of its new works and general offices at Michigan City, Indiana, and the removal to that city from Harvey, Ill., of its executive headquarters. The new plant, with its 175,000 ft. of additional floor space, more than trebles present capacity.

P. W. Wood, formerly sales engineer, The Buda Company, has established a railway sales agency at 811 Canal Bank Bldg., New Orleans, La. Among other accounts, Mr. Wood will handle the products of the Buda Company, the Chillingworth Manufacturing Company and the Track Specialties Company. He will also handle a complete line of track, car and overhead equipment for electric railways.

Combustion Engineering Corporation, New York City, manufacturer of mechanical stokers, furnace equipment, etc., has changed the location of its Philadelphia office to tenth floor, Finance Building. This territory is under the management of W. C. Stripe. The change was brought about by the development of business which entailed increasing the sales organization and adding a new service department, thereby necessitating larger quarters. The Philadelphia office it is stated, is now in a position to render as complete service as the home office.

New Advertising Literature

Railroad Electrification.—The Westinghouse Electric & Manufacturing Company has issued descriptive leaflet 3,450, on the Hoosac tunnel electrification, completed ten years ago.

Pinions.—R. D. Nuttall Company, Pittsburgh, Pa., is sending a letter to operating men in the electric railway industry, inclosing bulletin No. 30, dealing with drop-forged steel pinion blanks.

Cutting Metal.—Haynes Stellite Company, 30 East Forty-second Street, New York City, has issued two booklets, Vol. No. 9 and No. 10, of the Stellite Reference Library, devoted to Stellite welded-tip tools and Stellite bar stock, this product being a metal for high-speed cutting tools.

The PEACOCK Staffless

*Stops the Car—
Not the Passengers!*



When the crowds swarm aboard the platform of your Safety Cars this Summer—will a handbrake be there to stick well out into the vestibule, take up valuable space and generally get in the way?

Not if you use the Peacock Staffless.

The pressed steel housing of THIS brake projects into the vestibule only $3\frac{1}{4}$ inches from the dash.

Yet consider this—BESIDES saving at least one-half the space taken up in the vestibule by the ordinary hand brake

—the Peacock Staffless delivers at least 3 times the pull to the brake rod for the same human effort on the hand wheel!

That is—it does STOP the car, no matter what the emergency—and it does not get in the way and help stop the passengers.

This is merely another Peacock point for you to ponder.



"The Peacock
Staffless"

NATIONAL BRAKE COMPANY

890 Ellicott Square
Buffalo, N. Y.

Bankers and Engineers

Ford, Bacon & Davis

115 BROADWAY, NEW YORK
Detailed Examinations by Experts
REPORTS FOR FINANCING COVERING
Valuation Turnover Rates
Costs Reserves
UTILITIES INDUSTRIALS SHIPPING

THE J. G. WHITE ENGINEERING CORPORATION

Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water
Powers, Gas Plants, Steam and Electric Railroads,
Transmission Systems
43 Exchange Place, New York

STONE & WEBSTER

Incorporated
Design and Construct
STEAM POWER STATIONS
WATER POWER DEVELOPMENTS
TRANSMISSION LINES AND SUBSTATIONS
INDUSTRIAL PLANTS GAS PLANTS
NEW YORK BOSTON CHICAGO

JOHN A. BEELER

OPERATING, TRAFFIC AND RATE INVESTIGATIONS
SCHEDULES—CONSTRUCTION—VALUATIONS
OPERATION—MANAGEMENT
52 VANDERBILT AVE., NEW YORK

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

A. L. DRUM & COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS
VALUATIONS AND FINANCIAL REPORTS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC
RAILWAYS
76 West Monroe St. CHICAGO, ILL.

THE ARNOLD COMPANY

ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

ENGELHARDT W. HOLST

Consulting Engineer
Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

ALBERT S. RICHEY ELECTRIC RAILWAY ENGINEER

WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

Robert E. Horton Harry Barker Robert C. Wheeler HORTON, BARKER & WHEELER Engineers

Investigations, Reports, Design and Supervision of Con-
struction for Power Development and Transmission:
Dams, Reservoirs, Water Supply, Sewerage, Sewage dis-
posal; Specialists in Public Utility Rates and Valuation.
27 Dow Building 25 No. 10 So. Market Sq.
Albany, N. Y. Harrisburg, Pa.
Engineering Laboratory, Voorheesville, N. Y.

REPUBLIC ENGINEERS, INC.

CONSULTING AND CONSTRUCTING ENGINEERS
Valuations Reports Investigations
Designs Construction Management
60 BROADWAY, NEW YORK
CLEVELAND, OHIO YOUNGSTOWN, OHIO
Illuminating Bldg. Mahoning Bank Bldg.

ROBERT M. FEUSTEL

CONSULTING ENGINEER
Rate, Traffic and Reorganization
Investigations
Fort Wayne, Indiana

C. E. SMITH & CO.

Consulting Engineers
2065-75 Railway Exchange Bldg., St. Louis, Mo.
Chicago Kansas City
Investigations, Appraisals, Expert Testimony, Bridge
and Structural Work, Electrification, Grade Crossing
Elimination, Foundations, Power Plants

WALTER JACKSON

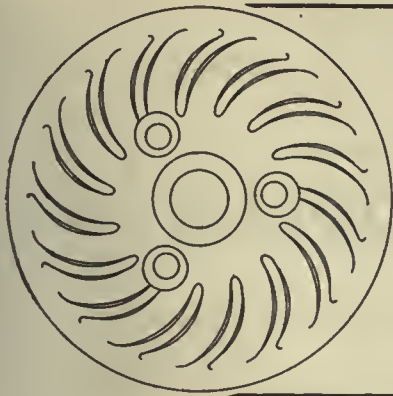
Consultant
FARES, BUSES, MOTOR TRUCKS
More revenue from more riders
143 Crary Ave., Mt. Vernon, N. Y.
Address June and July:
13 Ranulf Road, Hampstead, N. W. 2, London, Eng.

HEMPHILL & WELLS

CONSULTING ENGINEERS
Gardner F. Wells John F. Layng Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

Parsons, Klapp, Brinckerhoff & Douglas WM. BARCLAY PARSONS H. M. BRINCKERHOFF EUGENE KLAPP W. J. DOUGLAS

Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports
CLEVELAND NEW YORK
743 Hanna Bldg. 84 Piec St.



**Griffin Wheel
Company**
McCormick Building
Chicago, Ill.



GRIFFIN F. C. S. WHEELS
For Street and Interurban Railways

All of our plants have adequate facilities for fitting wheels to axles

FOUNDRIES:

Chicago	Detroit	Boston	St. Paul	Tacoma
	Denver	Kansas City	Los Angeles	

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and
Reports to Bankers and Investors
Security Building, St. Louis, Mo.

Byllesby
Engineering & Management
Corporation
208 S. La Salle Street, Chicago
New York Tacoma

L. E. GOULD
Consultant and Specialist
Energy Measurement
For Electric Railways
Investigations · Tests · Recommendations
Old Colony Bldg. Chicago

KELLY, COOKE & COMPANY
Engineers
149 BROADWAY NEW YORK 424 CHESTNUT STREET PHILADELPHIA

MARK WOLFF
Certified Public Accountant
Specializing in Public Utility Rate Cases
Statistical Analyses Audits Financial Investigation Expert Testimony
FLATIRON BUILDING NEW YORK CITY

**DAY & ZIMMERMANN, INC.**
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

E. W. CLARK & CO. MANAGEMENT CORPORATION
Engineers
Unit Power Plants insure low power costs
Huntington Bank Bldg., Columbus, Ohio

Salesmen of Transportation

YOUR conductor is a power for good or ill. He sells your service to the public. What kind of a salesman is he? You pay him for the use of his abilities. Are you getting in return his whole hearted support?

THE Ohmer System of fare accounting gives the conductor an opportunity to show you the quality of his work. It gives you an analysis of his service so that you may know his exact value. It furnishes you with correct estimates of your man power. It gives you detailed unchangeable reports of the business done by each conductor in each car.

IF you are interested in clean cut records of earnings, quick and efficient handling of fares, the building up of public good will, the making of more money, tell us how many cars you operate, the classes of fares collected and we will make you the kind of a proposition which has proven acceptable to hundreds of other progressive electric railway managers.

Ohmer Fare Register Company
Dayton, Ohio

Higher Taxes for Street Railways

Increased Taxes of Street Railways, sure to follow the failure or neglect to "Stop-off" Deterioration of track.

A Re-classification of tax items, will show that one of the largest items is entered up as "Maintenance."

Taxes, Municipal, State and Federal, are payable, semi-annually or annually. Look Big.

Taxes, entered as "Maintenance," are paid weekly. Look Small.

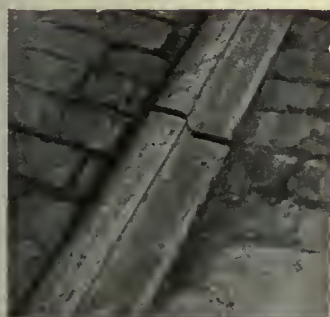
How the increase of Tax of Maintenance is computed:

Multiply the loss and damage, to rails, paving road-bed, rolling-stock, plus loss of current, from one "Bad Joint" by the number of such joints.

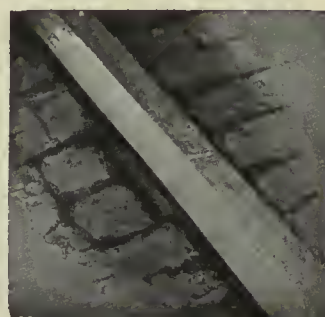
This tax will amount to an ENORMOUS increase to the regular tax.

"A weld in time" will save Ninety per cent. of the ultimate "Sure as taxes" expenditure.

The "Indianapolis," After 10 Years' Test, Still the Best
MAINTENANCE ELIMINATOR.



BEFORE



AFTER

Last Word in Reclamation of old and installation
of new track

ATTEST:

More Roads using the "Indianapolis Method" Than ALL OTHER methods COMBINED.

More Roads using "Indianapolis Welded Joints" Than are using all types COMBINED.

More "Indianapolis Fluxated Welding Steel Electrodes" used for TRACK purposes than all other brands of WELDING wire COMBINED.

If you are a USER, the more you use the more you SAVE.

If you are not a USER, you are a LOSER. JOIN the SAVERS.

Don't NEGLECT to send for our Booklet on Track Maintenance

Indianapolis Switch & Frog Co., Springfield, Ohio

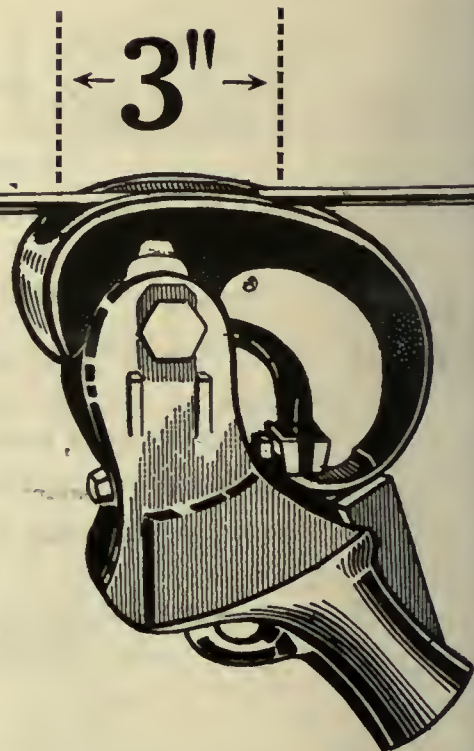
New England Representative: J. J. Costello, 201 Devonshire St., Boston, Mass.

ARCING

vs

FRICTION

Perhaps electric railways would be quicker to modernize their current-collection systems if they actually analyzed the causes of wire wear which is no small factor in maintenance. Instead of tracing wear largely to *friction*, careful investigation will show you that *arcing*, with its inevitable rust-like deterioration of both wire and trolley wheel, is the real enemy to trolley wire life.



One of the cars of the Portland-Lewiston Interurban
Equipped with Miller Trolley Shoes

Actual micrometer measurements of the wire on the Portland-Lewiston Interurban Railway were made at regular intervals at a dozen points within 10 inches of the ears. They showed that after four months there was no visible wear at nine points and less than .001 inch wear at three others!

The greater contact area of the Miller Shoe (three inches) not only "dilutes" friction by distributing it over greater area, but by its permanent, non-jumping grip on the wire, *prevents all sparking*

We simply ask you to let us submit some plain facts on trolley shoes which will save you money

Miller Trolley Shoe Co., West Newton, Mass.

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago

EASTERN REPRESENTATIVE: National Railway Appliance Co., New York

SALES REPRESENTATIVES:

Alfred Connor
Denver, Colo.

T. C. White & Co.
St. Louis, Mo.

F. F. Bodler
San Francisco, Calif.

W. M. McClintock
St. Paul, Minn.

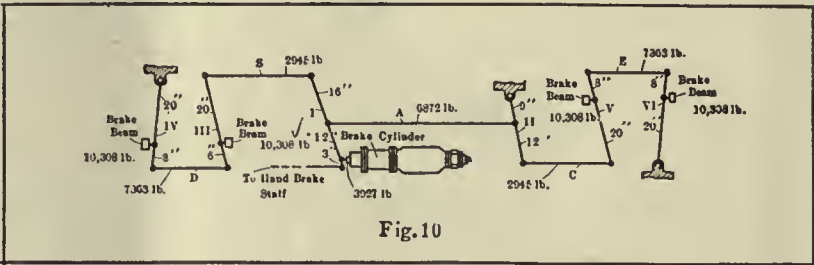
S. I. Wallis
Los Angeles, Calif.

W. F. McKenney
Portland, Oregon

Hand Brake or Air Brake—You Want Your Pins and Bushings BOYERIZED



When "the sum of the forces delivered to the brake-beams of the left-hand truck is equal to 10,308 + 10,308 lb.; that is, to 20,616 lb., the sum of the forces delivered to the brake-beams of the right-hand truck is also known to be 20,616 lb."



And so on continued Mr. H. M. P. Murphy in another of his excellent brake-rigging articles, this being from the April 16 "Determination of Forces on Eccentric Levers and Bell Cranks."

Now what about those little connectors in the brake rigging? The pins and bushings?

Are you sure that they will safely stand

the tug and pull of these 20,000 lb. forces and more if made of nothing better than untreated or unequally treated steel?

Wise operators — and most of them are wise — know that such forces are not to be trifled with for the sake of saving a few cents in maintenance with the chance of losing many dollars in shopping time and accident cost.

That's why the mark of a "Safety Always" electric railway is Boyerized Pins and Bushings plus

Boyerized Stag Brand Manganese Brake Heads

Brake Hangers,
Brake Levers
Pedestal Gibs

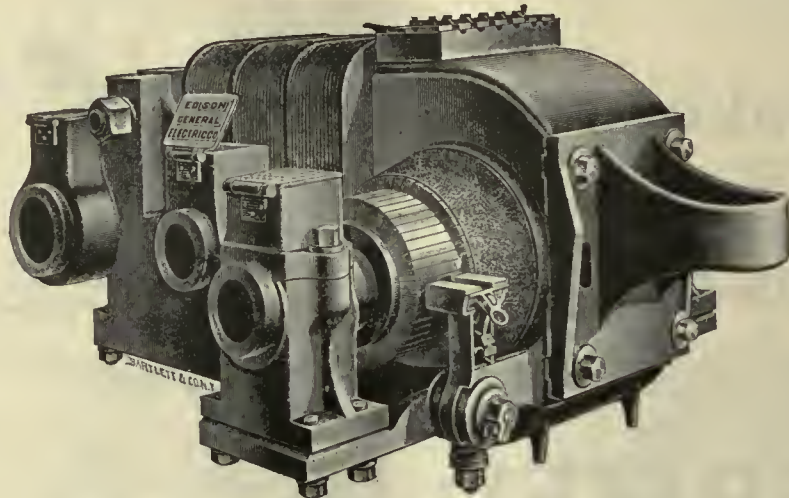
Brake Fulcrums
Center Bearings
Side Bearings

Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates

Bemis Car Truck Company
Electric Railway Supplies
Springfield, Mass.

REPRESENTATIVES:

D. L. Beaulieu, P. O. Box 3004, Boston, Mass.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon.



Edison General Electric Company Narrow Gauge Double Reduction Motor
Thirty years ago—One of the exhibits in the 1891 Convention Issue

The Annual Exhibit of
*Electric Railway Equipment
Materials and Supplies*

has appeared every year for over
a generation in the advertising
section of the

**ELECTRIC RAILWAY JOURNAL
ANNUAL CONVENTION
AND
CONVENTION REPORT
ISSUES**

This year a special effort is being
made by the industry's most pro-
gressive manufacturers to exhibit
their latest products in the form
that will provide electric railway
executives with the maximum of
useful and interesting information.

The Annual Convention Issue will be dated

SEPTEMBER 24, 1921



Why we make Two Grades of Electric Car Oil

THE Texas Company manufactures two grades of Texaco Electric Car Oil—one for summer and one for winter use.

There is a good reason for this.

Temperature statistics in New York show that the average temperature for the month of January is about 30° F.—and for the summer about 74° F.—a difference of about 44°.

Consequently we make a summer and a winter grade of car oil.

In manufacturing them this seasonal temperature difference is taken into account and the oils differ from each other in viscosity sufficiently to compensate for this; so that in use outdoors in season they will both have approximately the same viscosity.

As both oils are admirably suited for the work from the standpoint of lubricating quality, it is readily seen that by changing seasonally you will come pretty close to getting identical lubricating conditions throughout the year.

Texaco Electric Car Oils are carefully refined pure mineral oils.

They do not decompose, become rancid, or give off disagreeable odors under any kind of working conditions. They do not cause a glazing of the waste. Being homogeneous, they feed evenly and steadily. They are being used with great success in various parts of the country.

We shall be glad to give specific information on the lubrication of any, or all, of your rolling stock or power plant equipment.



THE TEXAS COMPANY
DEPT. R-J · 17 BATTERY PLACE · NEW YORK CITY
HOUSTON · CHICAGO · NEW YORK
OFFICES IN PRINCIPAL CITIES



Bezoar

Bezoar stones, which are petrifications found in the intestines of the Persian wild goat, are held to be a general antidote against poisons and are highly regarded by native practitioners.

It is puzzling why anyone should attach any significance to the contents of a goat's insides, but no less a personage than the Emperor Napoleon received from the Shah of Persia a gift of three of these stones as a proper precaution against poisoning.

Ridiculous, you say? Yes, but how about the native Ohioan who carries a buckeye in his pocket to stave off the rheumatism; or the oil prospector who carries a rabbit's foot; or the native of the cotton belt who several years ago took pink pills as protection against Halley's Comet?

Or the operator who buys carbon brushes at random and expects them to fit in and do work they were never intended to do? Common sense and logic indicate that this is hopelessly foolish. Morganite engineers, by fitting the right brush to the job and obtaining excellent results, prove that it is.



Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp., 13th and Wood
Sts., Philadelphia

Electrical Engineering & Mfg. Co.,
907-909 Penn Avenue, Pittsburgh

R. W. Lillie Corporation,
176 Federal Street, Boston, Mass.

W. R. Hendey Co., Hoge Bldg., Seattle

Herzog Electric & Engineering Co., 150 Steuart St.,
San Francisco

Charles Farnham, I. W. Hellman Bldg.,
Los Angeles

Railway & Power Engineering Corporation, Ltd.,
131 Eastern Ave., Toronto, Ontario, Canada



“STANDARD”

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Gear Blanks

Steel Forgings

Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells

Steel Springs



*“The ‘Standard’ Brand on your material
is an assurance of eventual economy.”*



STANDARD STEEL WORKS CO.

GENERAL OFFICES

500 NORTH BROAD ST., PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA
ST. PAUL

RICHMOND
SAN FRANCISCO
NEW YORK
HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE



49 The map above shows the location of the 49 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels

Chicago	3	Boston	Huntingdon W Va
St. Louis	2	Detroit	Wilmington, Del
Buffalo	4	St. Paul	Houston, Tex
Pittsburg	2	Kansas City, Kan	Hannibal, Mo
Cleveland	2	Denver	Reading, Pa
Amherst N.S.		Tacoma	Baltimore
Montreal		Rochester, N.Y.	Richmond, Va
Mich. City, Ind		Savre, Pa	Fl. William, Ont
Louisville		Berwick, Pa.	St. Thomas, -
Mt Vernon, Ill		Albany	Hamilton,
Ft. Wayne, Ind		Toronto	Ramapo, N.Y
Birmingham		New Glasgow N.S	Marshall, Tex
Atlanta		Madison, Ill.	Los Angeles
Savannah			Council Bluffs

AMERICAN RAILROAD ASSOCIATION STANDARDS

650 lb wheel for 60,000 Capacity Cars
 700 lb. wheel for 80,000 Capacity Cars
 750 lb. wheel for 100,000 Capacity Cars
 850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for
 Seventy Years

Where
**CHILLED
 IRON WHEELS**
*are made for Railway
 and Street Car Service*

*Capacity 20,000 per day
 25,000,000 in Service*



Association of Manufacturers
 of Chilled Car Wheels

1847 Mc Cormick Bldg.
CHICAGO



Bates One-Piece Steel Poles with Ornamental Lighting

This installation illustrates one of the possibilities of combining Artistic Bates Poles with ornamental lighting units. The excessive number of poles required where trolley conductors and lighting units are installed on separate poles is not only decidedly inartistic, but is also a needless waste of good material. Of course, it is necessary that an

artistic steel pole be used for such a combination of purposes.

The series lighting conductor is run from pole top to pole top eliminating the use of expensive, troublesome underground cable.

The use of Bates Permanent Steel Poles with ornamental lights represents maximum economy and the utmost in art.

Bates **E**xpanded **S**teel **T**russ **C**o.

208 South La Salle Street
CHICAGO, ILLINOIS



TRADE MARK
REG. U. S. PATENT OFFICE.

VARNISHED CAMBRIC Wires and Cables

are made with the same care and high regard for quality which distinguishes the production of OKONITE rubber insulation.

*We are prepared to handle any high grade proposition,
and solicit your inquiries.*

"Manson" Tape (Friction)

"Okonite" Tape (Splicing Compound)

THE OKONITE COMPANY, Passaic, New Jersey

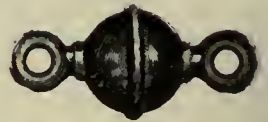
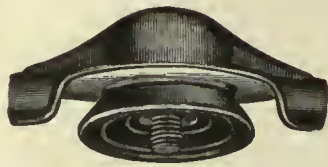
Incorporated 1884

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

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Maximum Strength

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ANDERSON

Round Top Straight Line Suspension



Your overhead is completely insured by Anderson line material.

It has drop forged steel studs.

It is made with outriggers turned up or down.

It is sturdily reinforced throughout.

No creepage troubles ever have been experienced.



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"The Wood Eternal"

gives insurance against a continuous big *labor cost* for renewals and replacements in the many railway uses for lumber.

When you specify and use
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for Ties, Fencing,
Trunking and Cap-
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you know it will give longer service than any other material. You know, too, how labor costs exceed material costs in almost every case. Of course even Cypress may eventually have to be replaced. Nothing lasts quite "forever." But in the long service-life you get from all-heart Cypress you will have *saved* a lot of labor costs in *maintenance alone*.

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An important step towards lower maintenance cost is the utilization of Helical Gearing wherever possible.

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Nuttall BP Heat Treated Helical Gearing is guaranteed to give four times the life of untreated gears in identical service, and is especially adaptable for railway service.

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Built for Permanency

Reading compromise or step joints are made from your own specifications and are guaranteed. Only the highest quality of heat treated cast steel goes into a Reading joint. By this casting process, the metal is concentrated at the point of greatest distribution of metal insuring a joint of greatest strength.

Insist upon them for your new and rebuilt track

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IMPERIAL Corrugated CULVERTS

Made of



—Anti-Corrosive

In IMPERIALS you get corrugated culverts that are shaped and riveted with the utmost care. Each section overlaps the other one full corrugation—a 2½-in. lap joint. On diameters of 24 inches or under our double rolled end reinforcement will be furnished free of charge. Joining bands also furnished for connecting continuous lengths in the field.

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MANUFACTURERS
CANTON, OHIO, U.S.A.

Consider the
Value of the
TIME SAVED
by
BAYONET
Trolley Equipment

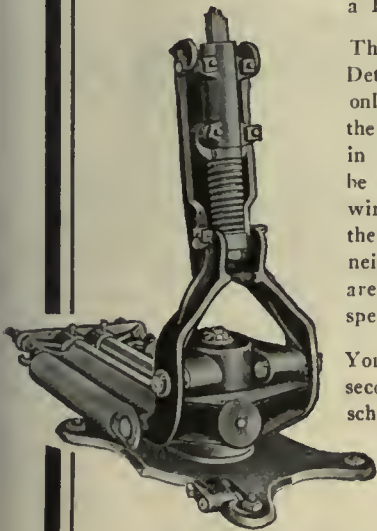


10
Seconds

are all the time required to change a Bayonet Trolley Harp or Wheel, or substitute a Bayonet Sleet Cutter.

The Bayonet Trolley Base with Detachable Pole Clamp is the only trolley base made on which the trolley pole can be changed in 30 SECONDS and the wheel be in perfect alignment with the wire, no tools required to do the job. And remember that neither safety nor durability are in any way sacrificed for speed.

You know how valuable those seconds are when headway and schedules are to be maintained.



Bayonet Equipment is sold subject to approval. It's the surest step you can take toward economy-plus-efficiency.

Bayonet Trolley Harp Co.
Springfield, Ohio

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U-RE-LITE



A modern Circuit Breaker to meet modern conditions. An I-T-E Circuit Breaker in a steel box: so much better than a fused switch that it is in a class by itself.

It opens instantly on the occurrence of a short circuit or a predetermined overload and can be as instantly reset, but it cannot be closed if the overload continues on the line.

IT DOES AWAY WITH THE CONSTANT EXPENSE AND THE DAMNABLE ANNOYANCE DUE TO THE USE OF FUSES, FOR THE CRY "FUSE BLOWN" MEANS IDLE MEN. It greatly diminishes the possibility of fire from electrical causes and affords positive protection to employees as well as to light or power circuits.

Made in capacities of 60 amperes and under for D.C. circuits of 250 volts or less and A.C. circuits of 250 volts or less, single phase.

Each pole is closed by a slight turn of the handle, which is seen projecting above and below the tripping knob, by means of which the U-RE-LITE may be opened manually.

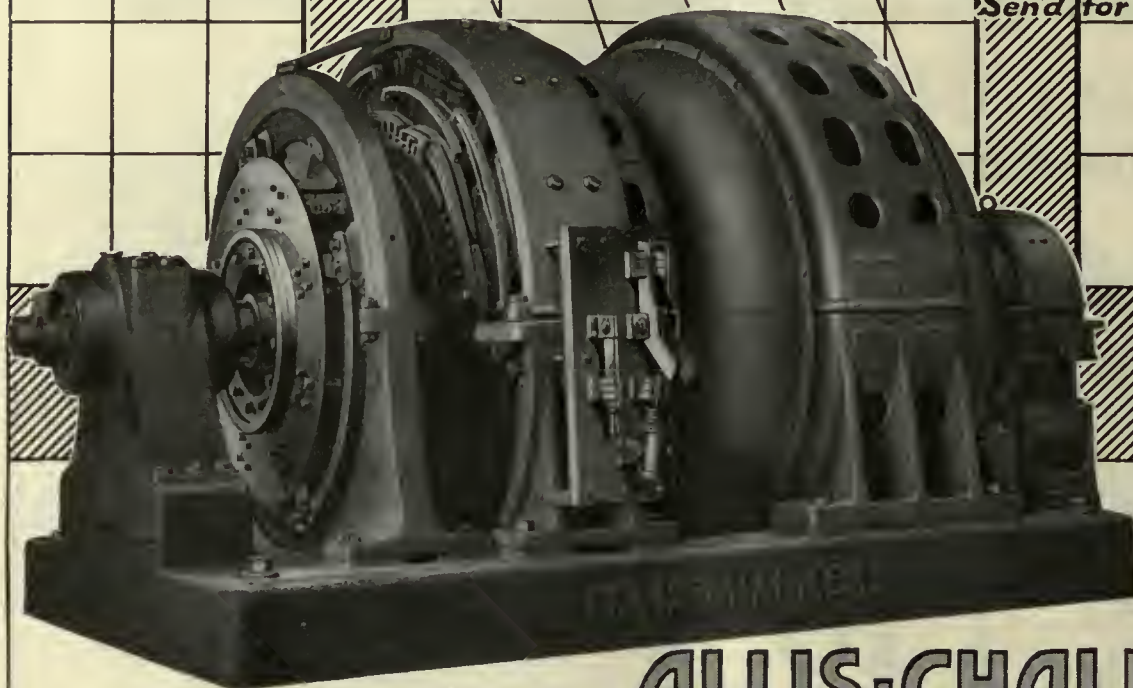
*First to the left,
Then to the right,
Turn the handle
And U-RE-LITE.*

LITERATURE UPON REQUEST

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PHILADELPHIA

RAILWAY SETS

*Built in ANY capacity
Send for Bulletin.*



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Exclusive selling agents for
HEEREN ENAMEL BADGES

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The most effective fare collection system is not complete without a final visible and audible fare registration on overhead registers.

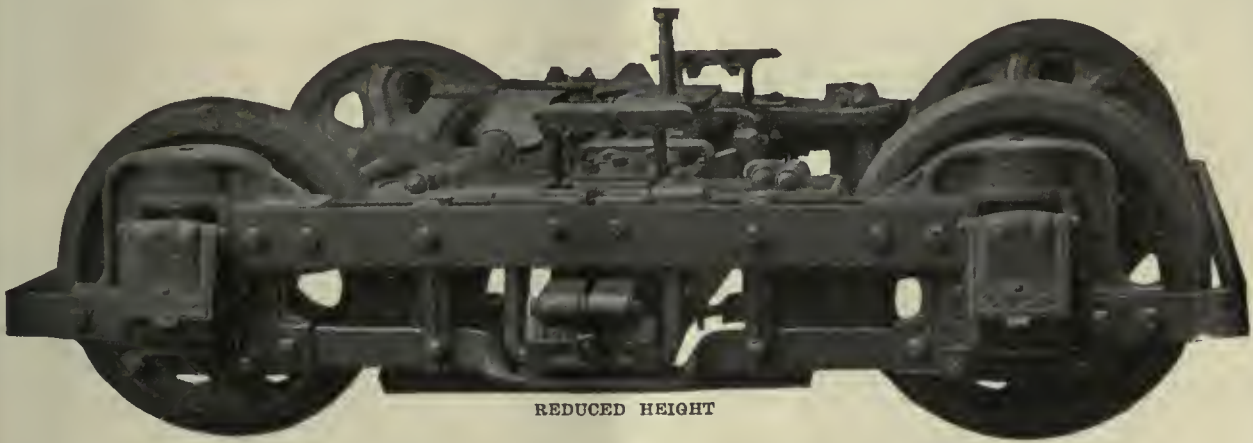
Cars equipped with money counting fare boxes need this visible and audible registration of the fare register as an additional check against the fare box. Where non-registering fare boxes are used a fare register affords the only method of checking against the fare box. Only by their use can the registration of paper tickets and transfers be made.

International Fare Registers have been serving Electric Railways and City Systems for 25 years. The test of long service has established them as the standard equipment for this use.

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Watch your gears on
"Safety Cars" + "Baby motors". The
superiority of Tool Steel hardening
is more pronounced on the fine
teeth than on coarser pitches.

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Mounted on 26-in. Wheels with Springs Over Journal Boxes.
Designed to Mount Centre and End Entrance Cars Low Down.

SWING MOTION AND FULL ELLIPTIC SPRINGS

Wheel Base 5 ft. 2 in. For Car
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Motors Inside Hung.

**EASY
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Journals $3\frac{3}{4}$ x 7 M. C. B. Type.
Height from Rail to Body Bolster,
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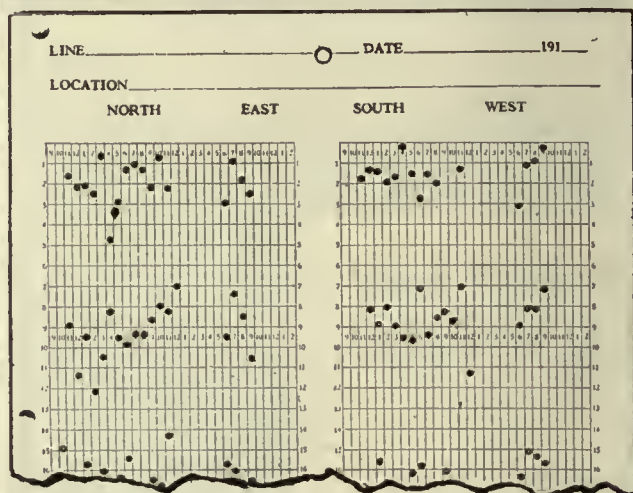
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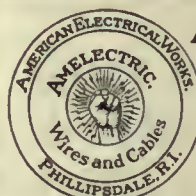
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LET US PROVE IT TO YOU

THE ELECTRIC RAILWAY IMPROVEMENT CO.
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SWITCHES—MATES—FROGS—CROSSINGS
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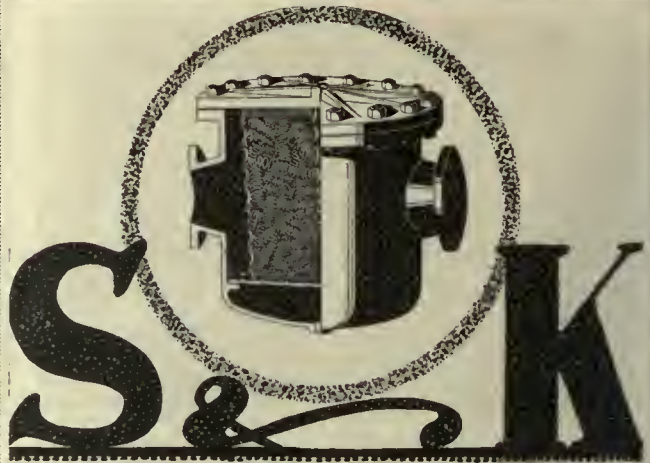


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KNOWS When to Open
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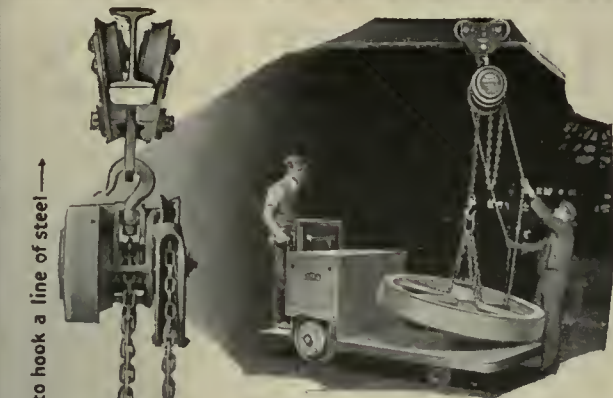
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Makes permanent, light, level pavement
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"TIGER-BRONZE"
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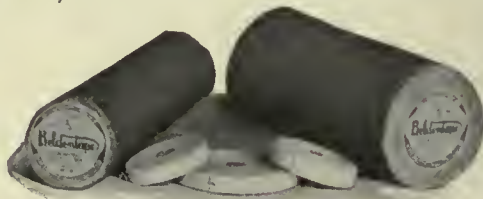
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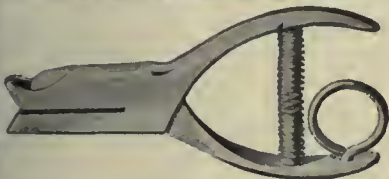
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special resistances.**

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Automatic Pin-and-Link
Couplers**



No. 18 Pin-and-Link Coupler

Van Dorn Automatic Pin-and-Link Couplers have enjoyed
for many years an enviable reputation in the electric
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The No. 18 Coupler, pictured above, is especially adapted to the
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There is a type of Van Dorn Coupler for your every need. Our
Engineering Department is always available to assist you in
selecting a Coupler that will best suit your particular style
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Van Dorn Coupler Company
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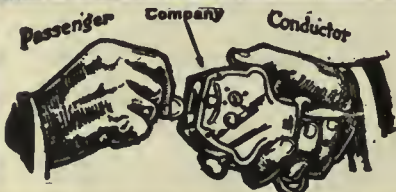


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Fare Box Co., Ltd.**
Preston, Ontario

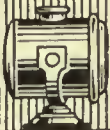


**Direct
Automatic
Registration
By the
Passenger**
**Rooke Automatic
Register Co.**
Providence, R. I.



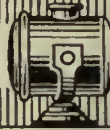
Use them in your terminals—
**PEREY TURNSTILES
or PASSIMETERS**

Faster than the ticket seller
Perey Manufacturing Co., Inc.
30 Church Street, New York City



Think "SEARCHLIGHT" First

ADVERTISING RATES



POSITIONS VACANT—Business Opportunities and other undisplayed ads. 8 cents a word, minimum \$2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment. 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:
1 to 3 in., \$4.50 an in. 15 to 29 in., \$3.90 an in.
4 to 7 in., \$4.30 an in. 30 to 49 in., \$3.80 an in.
8 to 14 in., \$4.10 an in. 50 to 99 in., \$3.70 an in.

POSITIONS
VACANT

EMPLOYMENT

POSITIONS
WANTED

POSITIONS VACANT

TIMETABLE maker, able, ambitious, experienced; state qualifications, experience and salary expected. Chicago Surface Lines, 604 Borland Bldg., Chicago.

POSITIONS WANTED

DRAUGHTSMAN experienced in street railway rolling stock work, desires change of position. Now employed. PW-889, Elec. Ry. Journal, Real Estate Trust Bldg., Phila.

ENGINEER, executive, electric railway and public service, construction, operation, maintenance; available immediately. Carl H. Fuller, 305 Elm Street, Youngstown, Ohio.

GENERAL foreman car construction; 25 years' experience. Can furnish best of references, from past and present employers. PW-894, Elec. Railway Journal.

SITUATION wanted as manager of railway or gas properties, preferably in the South. Have managed one of the largest combined street railway, gas and electric properties in the South for the past three years. Can furnish best references. PW-900, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

SUPERINTENDENT, 17 years' experience in all phases of transportation, traffic and equipment in northern Ohio; very satisfactory relations with present employers; personal reasons for considering change of location; age 37, married; excellent references as to character and ability. PW-901, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

TIME-TABLE maker, age 40, experienced, married; 15 years in present employment. desires change where appreciation is based on results obtained. PW-892, Elec. Ry. Journal, Real Estate Trust Bldg., Phila.

WORK WANTED

Work Wanted

Special track work only: examinations, reports, estimates, surveys, plans, specifications, purchasing and supervision; first-class work only, solicited by expert. WW-877, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

700 tons new 9 in.

GIRDER RAIL

Penna. Steel Co. Section 228, 107 lb. to the yard. Attractive price upon application. Subject to R. W. Hunt & Company's inspection. Prompt shipment.

H. M. FOSTER COMPANY
Continental Building, Baltimore, Md.

FOR SALE

Property and Equipment for Sale

The property and equipment of the former Norfolk & Bristol Street Railway; 21 miles located in Norwood, Walpole, Foxboro, Wrentham and Mansfield, State of Massachusetts; consisting of 60-pound T rails, 90-pound girder rails, overhead equipment, power house and equipment, car barn, rolling stock, electrical railway supplies, real estate, right of way and franchises; to be sold as a whole or in parcels, purchaser to take property where it is and remove it. Address John K. Howard, Esq., 55 Congress Street, Boston, Mass.

FOR SALE

TRANSFORMERS

1—Type H, Form RP, Cycles 60, 200 KVA., 19100/33000Y—2300 Oil Cooled, Step Up Transformer.

1—220 Volt (B) KW., 60 Cycle, Oil Cooled, Step Up Transformer. 19100/33000Y — 2300.

4—Type HS, Form RT, Cycles 60, 135 KVA., 17100/19100/33000Y — 370/370/185, Oil Cooled Step Down Transformers.

All filled with oil and in excellent shape.

UNION TRACTION CO.

Nashville, Tennessee

RAILS—RAILS

90 tons 90 lb. grooved girder Rails.
125 tons New 6 in. Tee—600 tons New 60 to 90 lb.
500 tons No. 1—70 lb. Relay Rails.
Switch Material, Frogs, Angle Bars, Spikes, Bolts.

ZELNICKER IN ST. LOUIS

Have you any rail or equipment for sale?

RYERSON COLD SAW

High Speed, direct connected to 3 phase, 60 cycle, 220 V. Motor. First Class Condition.

MOLINE "HOLE HOG"

double spindle Drill—Heads adjustable 4 in. to 24 in. Motor driven, without motor. Excellent.

ZELNICKER IN ST. LOUIS

FOR SALE

Generating Unit

1—480-hp., 100-r.p.m., 150-lb. pressure Bates Corliss Engine direct connected to 325 kw. D.C. generator, 550-volt Westinghouse, 100-r.p.m. with panel.

Central Illinois Public Service Co.
D. R. Truax, Purchasing & Stores Agent
Mattoon, Illinois

WANTED

PORTABLE
SUB-STATION

Either Motor Generator or Rotary Converter, 200 Kw.,—550/600 volts D.C. Suitable for 2300 volts A.C. operation.

Brockton & Plymouth St. Ry. Co.
HOLLIS T. GLEASON, Receiver
Plymouth, Mass

FOR SALE

300—G-E-67 and G-E-80 Motors
20—G-E-73 (75 hp.) Motors
22—G-E-203P (40 hp.) Motors.
4—G-E-205 Motors.
16—G-E-210 (65 hp.) Motors
4—G-E-219 (50 hp.) Motors
22—West-101B2 (40 hp.) Motors
2—West-506 (25 hp.) Motors
4—West-548 (75 hp.) Motors

TRANSIT EQUIPMENT CO.


501 Fifth Avenue, New York

Culvert and Drain Pipe

6—10 inches diameter.
Full mill lengths.

E. B. LEAF COMPANY
Real Estate Trust Bldg., Philadelphia, Pa.

For 20 Years
we have been
Buying and Selling
Second-Hand Cars
Trucks and Motors
At Your Service
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

 **In Stock**
for
Immediate Shipment 
**Turbo Units, Rotary Converters,
Transformers, Motor
Generator Sets, Dynamos
and Motors**
ARCHER & BALDWIN, Inc.
114-118 Liberty St., New York City
Tel.: 4337-8 Rector

FOR SALE

1,000—31 in. New Rolled Steel Wheels. Blue
Print and price will be furnished on applica-
tion.
10,000-lbs. No. 10 D.C.C. Magnet Wire.
100-lbs. No. 30 D.C.C. Magnet Wire.
500-lbs. No. 12 D.C.C. Magnet Wire.
150-lbs. No. 6 Flat D.C.C. Magnet Wire.
3,000-ft. No. 1—7 Strand Single Braid Cable,
N. E. C. Specifications.
10,000-ft. No. 1—19 Strand Single Braid Cable,
N. E. C. Specifications.
2,100-lbs. $\frac{3}{4}$ in. x .007 Yellow Bias Varnished
Insulating Tape, in 5 $\frac{1}{2}$ in. rolls.
300-lbs. No. 3 White Cotton Sleaving—Hope and
Anchor.
40—Canopy Switches—Westinghouse Electric
Company's Type 503-C, Style No. 33305.

Philadelphia Rapid Transit Co.
Purchasing Department
820 Dauphin Street, Philadelphia, Pa.

At A Sacrifice

14 Westinghouse Railway
68 and 68 C

MOTORS
complete

10 and 13 inch Railway Bonds

H. E. SALZBERG CO., Inc.
30 Church St., New York

FOR SALE

**Electric Weld
Rail Bonding Car**
in A-1 Condition

C. F. PROPST
803 Harris Trust Bldg., Chicago, Ill.

Service Value

Scrap value for idle used machinery or surplus material is not enough. If it can be used by others they will pay *service value* for it. "Searchlight" will find these buyers for you.

Manufacturers who accept used machinery in part payment for new can dispose of it promptly by advertising in the Searchlight Section.

Machinery used in manufacturing and displaced by other equipment can be sold at a fair price by advertising it in the Searchlight Section.

Wide-awake dealers, agents or representatives can be secured through little Searchlight "Want" ads.

Manufacturing sites, partners, help, capital—anything that anybody in the machinery field is likely to have for sale or exchange for something else—can be located or disposed of through the Searchlight Section.

The cost of putting your Wants in this projector is very slight, whether for a man, for a job or for a market.

Searchlight Section

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers
Ingersoll-Rand Co.

Air Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Automobile and Buses
Brill Co., The J. G.

Axis Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Standard Steel Works Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbitt Metal
More-Jones B. & M. Co.

Babbitt Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Bankers & Brokers
Coal & Iron National Bank

Batteries, Dry
National Carbon Co., Inc.
Nichols-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Slide
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
American Chain Co., Inc.
Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker, Walter A., Supply Co.
Inc.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Spring Tools, Car Wheel
Niles-Bement-Pond Co.

Bones—Junction and Outlet
National Metal Molding Co.

Boxes, Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms. (See also
Bates Expanded Steel Truss Co.
Creshead Eng. Co.

Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Poles, Ties, Posts, Etc.)
Ohio Brass Co.

Brake Adjusters
National Railway Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake
Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Traction Brake Co.

Brooms, Track, Steel and Rattan
American Rattan & Reed Mfg. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
National Carbon Co., Inc.
Westinghouse Elec. & M. Co.

Brushes, Graphite
National Carbon Co., Inc.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Bushings
National Metal Molding Co.

Bushings, Case Hardened &
Manganese
Bemis Car Truck Co.
Brill Co., J. G.

Bushings, Graphite & Wooden
Bound Brook Oilless Bearings Co.

Cables. (See Wires and Cables)

Cambric, Tapes, Yellow and Black
Varnished
Irvington Varnish & Insulator Co.

Cambric, Yellow and Black
Varnished
Irvington Varnish & Insulator Co.

Carbon Brushes. (See Brushes,
Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express
etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Railway Appliance Co.
St. Louis Car Co.
Thomas, Percy A.
Watson Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Car, Self-Propelled
General Electric Co.

Castings, Brass, Composition or
Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
More-Jones Brass & Metal Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.

Columbia M. W. & M. I. Co.
St. Louis Car Co.
Standard Steel Works Co.
Wharton, Jr. & Co., Inc., Wm.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers. Trolley
Earl, C. I.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling Car
Pantastote Co.

Circuit Breakers
Automatic Reclosing Circuit
Breaker Co.
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires
and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers Track—(See
also Snow-Plows, Sweepers and
Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling—(See Con-
veying and Hoisting Machinery)

Coil Banding and Winding Machine
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
Electric Service Supplies Co.

Colls, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Colls, Choke and Kieking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. B Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Condenser Papers
Irvington Varnish & Insulator Co.

Conduit Fittings
Chicago Fuse Mfg. Co.
National Metal Molding Co.

Conduits, Interior
National Metal Molding Co.

Conduits, Underground
Standard Underground Cable Co.

Connectors, Solderless
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.

Copper Wire
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roehling Sons Co., John A.
Samson Cardage Works
Silver Lake Co.

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B Co.

Cranes
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings, Frogs and Switches
Wharton, Jr. & Co., Inc., Wm.

Crossings, Manganese
Indianapolis Switch & Frog Co.

Crossing Signals. (See Signals,
Crossing)

Crossings, Track. (See Track,
Special Work)

Culverts
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co.
Pantastote Co.
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg. Co.

Dealers' Machinery
Archer & Baldwin
Cleveland Armature Wks.
Electric Equipment Co.
Foster Co., L. B.
Griewold Machine Co., Geo. M.
Hymen Michaels Co.
Transit Equipment Co.
Zelnicker Supply Co., Inc.
Walter A.

Derailing Devices. (See also Track
Work)
Cleveland Frog & Crossing Co.

Destination Signs
Columbia M. W. & M. I. Co.
Creshead Eng. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.



PERLEY A. THOMAS CAR WORKS

Manufacturer of Cars
and Car Materials

Cars of all types from one-man to large
interurban

HIGH POINT, N. C.

SASHES, DOORS
INTERIOR FINISH
VESTIBULES AND FRAMING

CURTAINS, VENTILATORS
SASH AND DOOR TRIMMINGS
DOOR AND STEP MECHANISM

Avoid Costly Car Lay-Ups



We have a brake
shoe for every kind
of wheel wear.

Avoid Costly Car Lay-ups and eliminate the expense of wheel removal by installing wheel truing Brake Shoes on all of your cars.

They work while your car miles pile up.

When flange only needs correction use type of brake shoe (section only) shown in cut.

Wheel Truing Brake Shoe Company
Detroit, Michigan

B. A. Hegeman, Jr., President
Charles C. Castle, First Vice President W. C. Lincoln, Mgr. Sales & Engineering
Harold A. Hegeman, Vice Pres. and Treas. Fred C. J. Dell, Secretary

National Railway Appliance Co.

50 East 42nd St., New York City

Hegeman-Castle Corporation National Railway Appliance Co.
343 So. Dearborn St., Chicago, Ill. Munsey Bldg., Washington, D. C.
National Railway Appliance Co.
Little Bldg., Boston, Mass.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Anderson Slack Adjusters
Genesco Paint Oils
Dunham Hopper Door Device
Feasible Drop Brake Staffs
Flaxlinum Insulation
Anglo-American Varnishes,
Paints, Enamels, Surfacers,
Shop Cleaner
Johnson Fare Boxes

Drew Line Material and Rail-
way Specialties
Perry Side Bearings
Hartman Centering Center
Plates
Economy Power Saving Meter
H & W Electric Heaters
Garland Ventilators
Pitt Sanders
National Safety Car Equipment
Co's One-Man Safety Cars

Reduce Commutator Wear and Losses Due to "Tie-Ups"

To be absolutely safeguarded against excessive commutator wear—assured of real mileage day in and day out—and to obtain lower operating costs, use

Columbia Pyramid Brushes

the brushes that were made to suit the commutator and the service.

You name the job—we'll name the brush

National Carbon Company, Inc.
Cleveland, Ohio

ELECTRIC HEATER EQUIPMENTS



THERMOSTAT CONTROL EQUIPMENTS

Address All
Communications
to

BUSH
TERMINAL
(220 36th St.)
Brooklyn, N. Y.

Literature on
Request



Speed Up Repairs

Speed Up Repairs and save time and labor by using the Comstock coil winding machine and armature coil press.

The Comstock Mfg. Co.
Wilkes-Barre, Pa.

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company
Carlisle, Pa.

FLOOD CITY

Rail Bonds and Trolley Line Specialties
Flood City Mfg. Co., Johnstown, Pa.



See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.



STUCKI SIDE BEARINGS

A. STUCKI CO.
Olliver Bldg.
Pittsburgh, Pa.

WHAT AND WHERE TO BUY

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Drivers, Sand
Electric Service Supplies Co.
Zelnicke Supply Co., Walter A. Inc.

Electrical Wires and Cables
American Electrical Works
Roebeling's Sons Co., J. A.

Electrodes, Carbon
Indianapolis Switch & Frog Co.

Electrodes, Steel
Indianapolis Switch & Frog Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bylesby & Co., H. M.
Clark Management Corp., E. W.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Fenstel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Enriehardt W.
Horton, Barker & Wheeler
Jackson, Walter
Kelly Cooke & Co.
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richy, Albert S.
Sanderson & Porter
Scotfield Engineering Co.
Smith & Co., C. E.
Stone & Webster
Wolff, Mark

Engines, Gas, Oil and Steam
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Expansion Joints, Track
Wharton, Jr. & Co., Inc., Wm.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.
Ohmer Fare Register Co.

Feed Water Heating
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works.

Fibre and Fibre Tubing
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.

Field Cols. (See Cols.)

Filters, Water
Scaife & Sons Co., Wm. B.

Flaximum Insulation
National Railway Appliance Co.

Floodlights
Electric Service Supplies Co.

Floor Plates
American Abrasive Metals Co.

Flooring Composition
American Mason Safety Tread Co.

Forgings
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
English Electric Co., Ltd.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Eye
Indianapolis Switch & Frog Co.

Gongs. (See Bells and Gongs)

Graphite
Morganite Brush Co., Inc.

Greases. (See Lubricants)

Grinders and Grinding Supplies
Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
Railways-Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Haskelite Mfg. Co.
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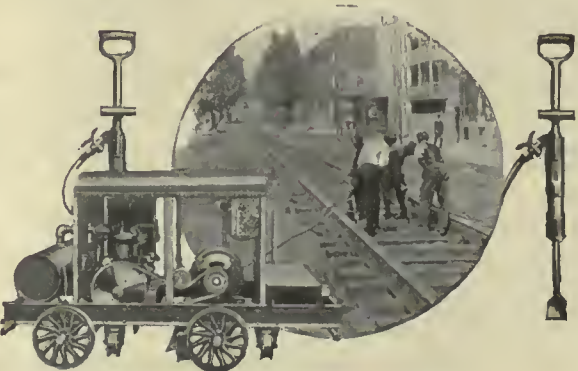


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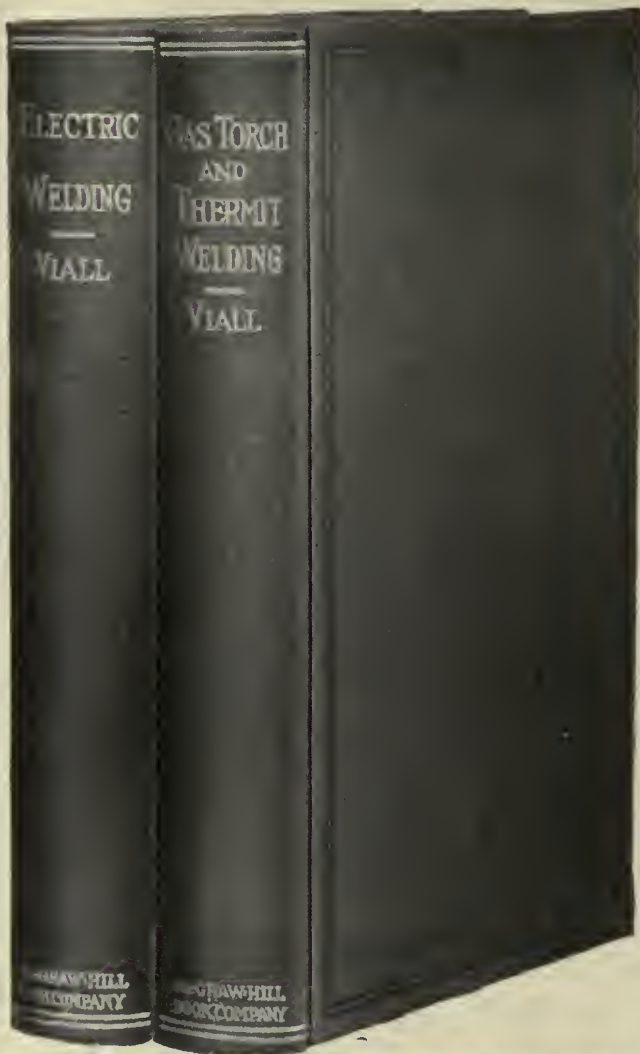
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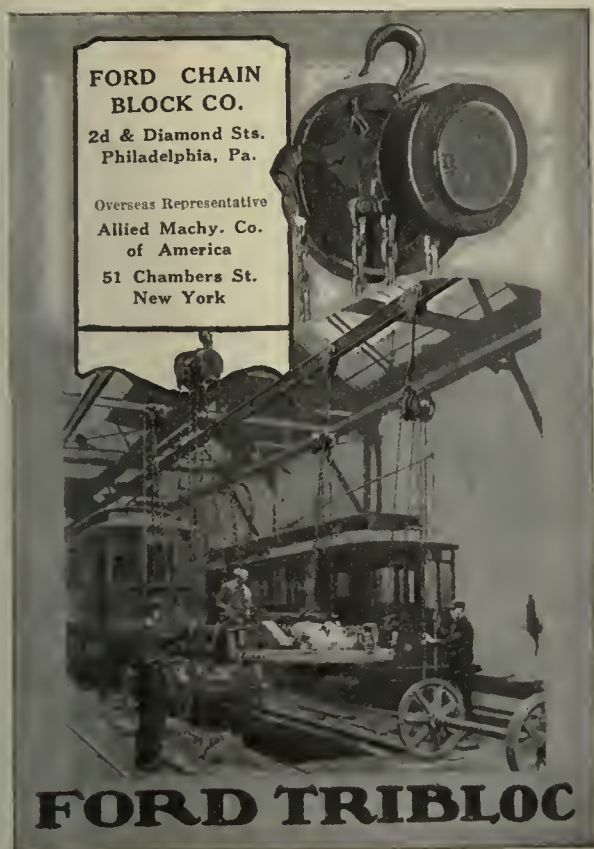
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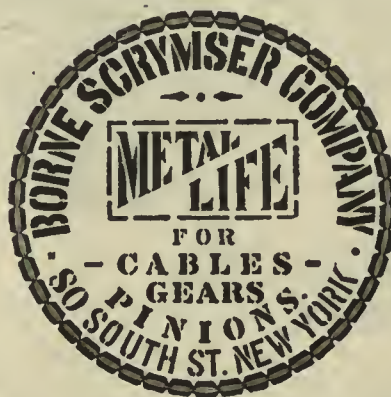
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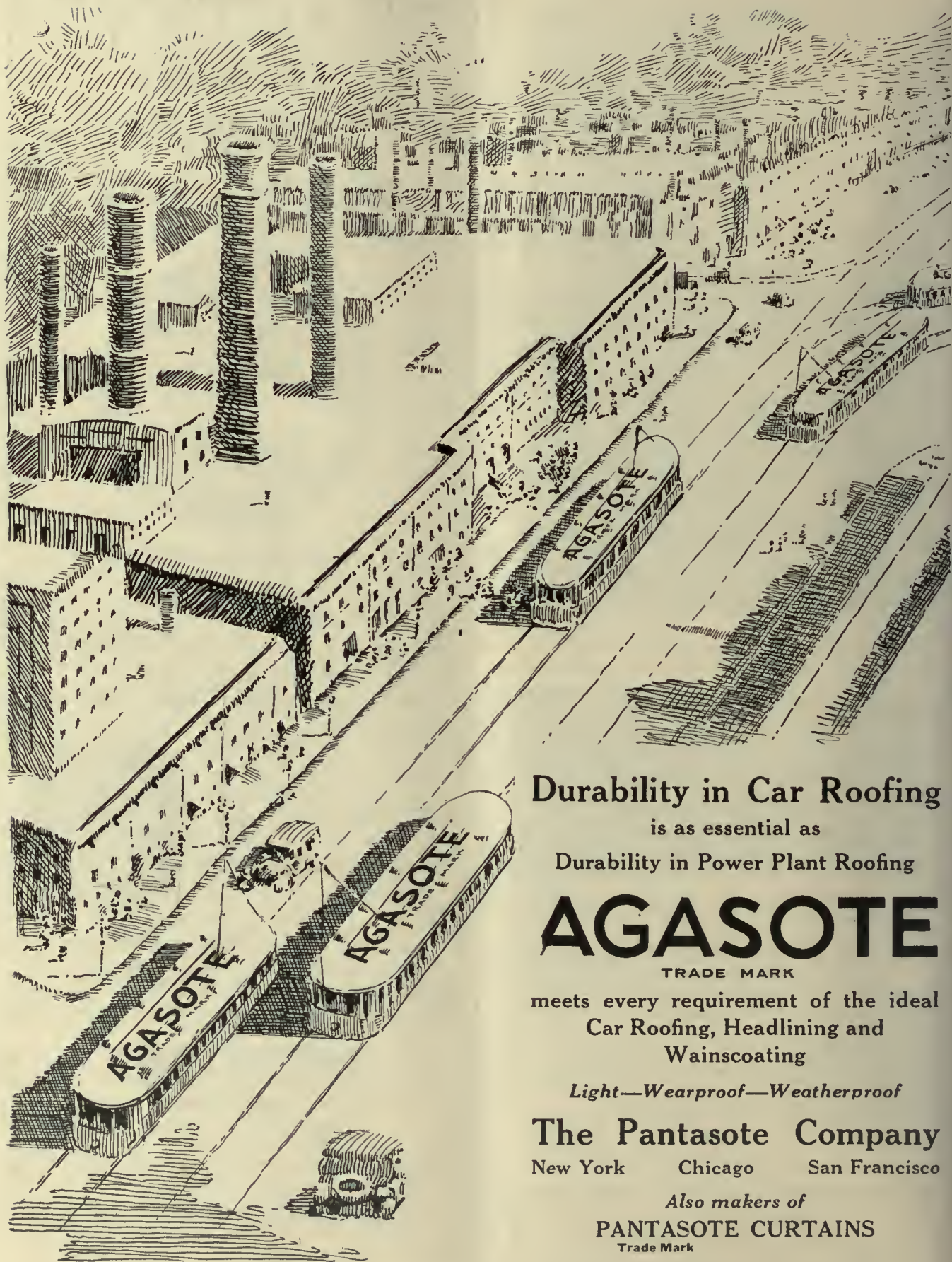
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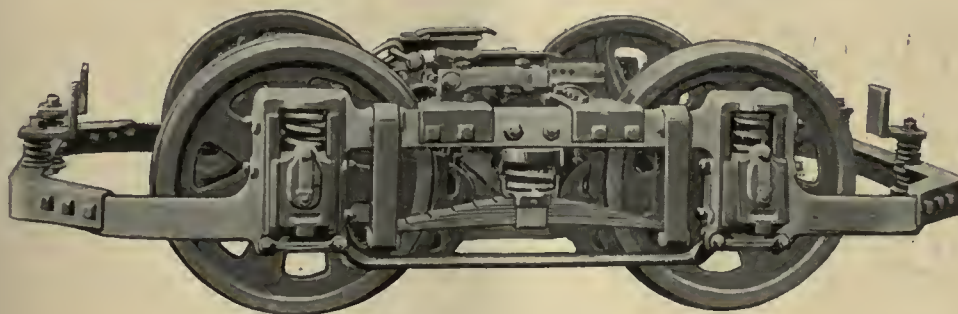
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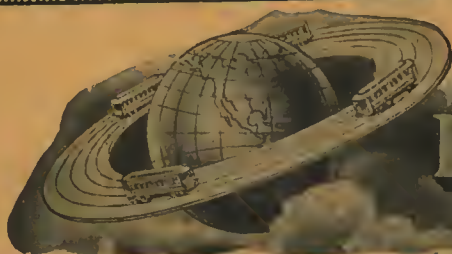


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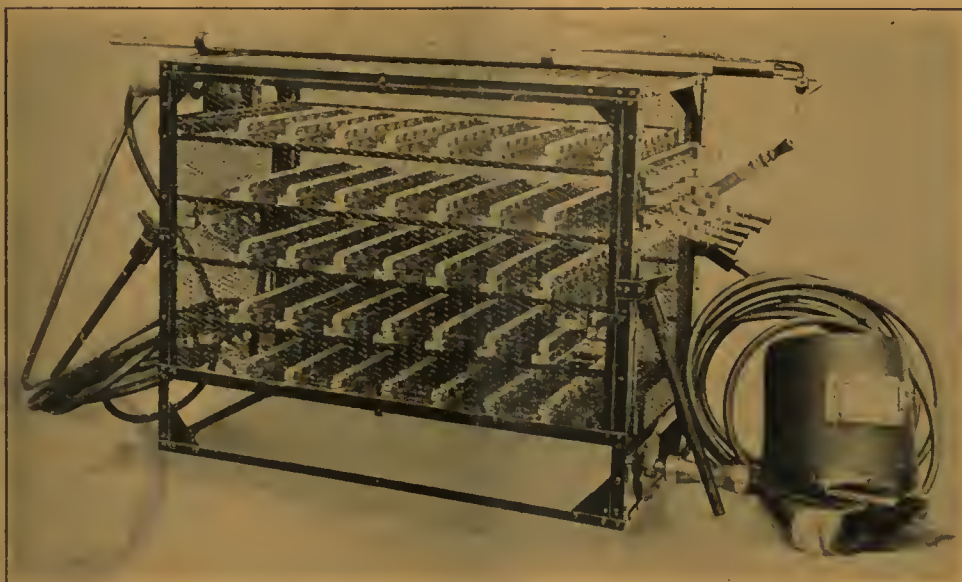


Barron G. Collier

INCORPORATED

Candler Bldg., New York

ELECTRIC RAILWAY JOURNAL



I N T R O D U C I N G

“AJAX”

Electric Arc Welder

Now offered after having demonstrated by three years of service that it is capable of safeguarding the reputation made by our Reciprocating, Universal and Atlas rail grinders. Among the features that will especially appeal to electric railway men are:

Portability—Weighs only 120 lbs., is 18 in. wide, 36 in. long by 28 in. high. Convenient hinged carrying handles. Can be transported on any car platform.

High Amperage means deep penetration — 333 amp. at 600 volts, 209 amp. at 250 volts. Practically 50% higher capacity than any other re-

sistance machine on the market, ample for good welding under all ordinary conditions. Good also for carbon arc welding.

Accessibility—All parts easy to get at, all circuits plainly traceable, all repairs easy to make with unskilled labor.

Completeness—Equipment includes everything necessary to start work—no extras to buy. Even the face shield, trolley pole, cables and welding handle are included.

We are staking our reputation on the satisfactory performance of these machines. Write us for complete details and prices.

Railway Track-work Company, Philadelphia, Pa.

Learn More About Operating Costs



While many railways are alert to the possibilities of renewing old motors with modern parts, a more thorough analysis will show that many motors now in use can never be made to operate efficiently, simply because they are worn out.



Where a large number of old motors must be used in regular service, accurate records of their performance and cost for maintenance will show which motors should be used least of all and which ones should be first replaced.



Where investigations of this kind have already been made, savings of 25% to 30% in cost for maintenance and power are obtained, by diverting cars with old motors to light-duty service, and using the more modern makes for heavy-duty requirements.



Westinghouse Railway Engineers are ready to help check your service. The use of Westinghouse standard modern motors is a big item in reducing operating costs.

*The small expense for an analysis
will prove highly profitable.*

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors

HENRY H. NORRIS, Managing-Editor

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Initial installation on one of Brazil's crack railroads now practically complete. Details of locomotives, substation and power distribution system are given by S. B. Cooper and W. D. Bearce. This pioneer undertaking is the forerunner of an extensive application of electric motive power in Brazil.....Page 1075

Details of New York City Municipal Car Improvements

Since the introduction of the large multi-side-door cars on the lines of the New York Municipal Railway various additions and refinements have been made to provide increased comfort and safety for passengers.....Page 1087

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Advertising Index—Alphabetical, 58; Classified, 52, 54, 56; Searchlight Section, 50-51

WORLD-WIDE

For Railroad Transportation

Electricity has demonstrated its success in railroad transportation. All existing electrifications point the way to greater accomplishments.

The flexibility and utility of electric power is destined to be the controlling factor in the development of our country's transportation requirements.

Experience with this subject points to the necessity of careful and open-minded study of the particular installation for which the plans are being made.

Recommendations of Westinghouse

Baldwin-Westinghouse electric locomotives are operating on most of the major electrifications in this country as well as in Italy, France, Japan, Brazil, Cuba and other countries where their great value has been fully realized.

The following partial list of important electrifications using Westinghouse electric locomotives will give an idea of the Westinghouse Company's activity in this work:

Pennsylvania Railroad (N. Y. Tunnel and Terminal), 600 Volts Direct Current
 Norfolk & Western Ry. (Single-Split-Phase), 11000 Volts Alternating Current
 Chicago, Milwaukee & St. Paul Railway, 3000 Volts Direct Current
 Long Island Railroad, 600 Volts Direct Current
 New York, New Haven & Hartford R. R. (Single-Phase), 11000 Volts Alternating Current
 Pennsylvania Railroad (Phila. Main Line Electrification), 11000 Volts Alternating Current
 Grand Trunk Railway (Single-Phase), 3300 Volts Alternating Current
 Boston & Maine Railroad (Single-Phase), 11000 Volts Alternating Current
 Piedmont & Northern Railway, 1500 Volts Direct Current
 Southern Pacific Railroad, 1200 Volts Direct Current

New York, Westchester & Boston Railway (Single Phase), 11000 Volts Alternating Current
 Erie Railroad (Single-Phase), 11000 Volts Alternating Current
 San Francisco, Sacramento Railway, 600 Volts Direct Current
 Paulista Rwy. of Brazil, 3000 Volts Direct Current
 Italian State Railways (Three-Phase), 3300 Volts Alternating Current
 Central Limones of Cuba, 1600 Volts Direct Current
 Midi Rwy. of France (Single-Phase), 12000 Volts Alternating Current
 Chichibu Rwy. of Japan, 1200 Volts Direct Current
 Western Rwy. of France, 600 Volts Direct Current
 Buenos Ayres & Western Railway, 800 Volts Direct Current
 Windsor, Essex & Lake Shore Railways (Single-Phase), 6600 Volts Alternating Current
 British Columbia Elec. Railway, 600-1200 Volts Direct Current
 Lake Erie & Northern Railway, 1500 Volts Direct Current

W

WESTINGHOUSE
ELECTRIC

Westinghouse Electric & Manufacturing Company
 Offices in all Principal Cities
 Representatives Everywhere

Westinghouse

ELECTRIC LOCOMOTIVES LINE AND POWER PLANT EQUIPMENT

ELECTRIFICATION



Southern Pacific Railroad



New York, New Haven and Hartford R. R.



Central Limones, Cuba



Norfolk and Western Railway



Boston and Maine Railroad—Hoosac Tunnel



New York, Westchester and Boston Ry.



Grand Trunk Railway



British Columbia Electric Railway



Chicago, Milwaukee and St. Paul Railway



Pennsylvania Railroad—Terminal Div.



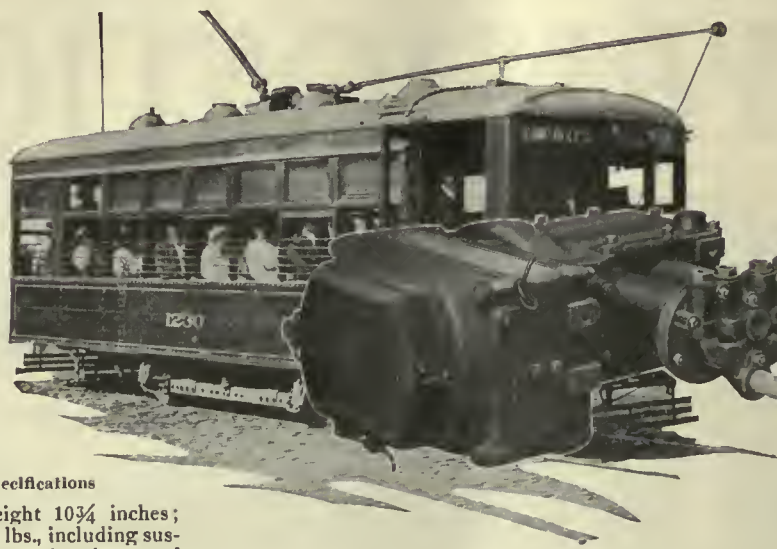
Italian State Railways



Pennsylvania Railroad—Phila.-Paoli Div.



A Superior Air Compressor for the Small Car



DH-10
"Bungalow"

Specifications

Overall height 10¾ inches;
weight 420 lbs., including sus-
pension irons, brackets and
bolts; displacement 10 cu. ft.
per minute when operating
against 100 lbs. on 600 volts.

WHEREVER LIGHT EQUIPMENT IS USED

THE DH-10 "Bungalow" has established itself as the most serviceable 10-foot Compressor in the Traction Field. As a small machine, designed especially for small, low-built, light-weight cars, it has appealed generally to electric railway operators who appreciate the importance of keeping their equipment nicely "balanced" so as to insure the greatest possible economy consistent with safety and efficiency.

AN INEXPENSIVE UNIT

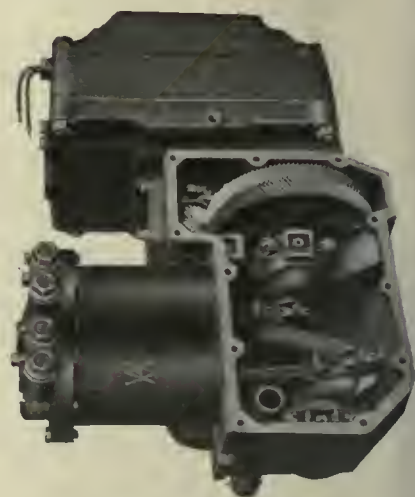
Owing to its high-class construction and superior service, the DH-10 is recognized as an attractive investment from the financial standpoint.

It materially reduces the expense of up-keep usually attaching to the ordinary compressor; is easy to assemble, permits ready access to all working parts, requires but slight attention, possesses the highest degree of durability—these features all combining to make for extremely low maintenance cost.

The design permits continuous operation for extended periods without possibility of a dangerous rise in temperature.

Send for Publication No. 9045

Note:—The complete line of Bungalow Compressors includes three sizes of 10, 16 and 25 cubic feet displacement, the designations of these being DH-10, DH-16 and DH-25.



POSITIVE LUBRICATION

An ingenious carrying system insures a constant and well-regulated distribution of oil over all the working parts. Such adverse conditions as low speed and diminished oil supply in the crank case have no effect on the efficiency of this arrangement. It is positive in every respect.

Westinghouse Traction Brake Company

General Offices and Works: Wilmerding, Pa.

"Fourteen Miles East of Pittsburgh"

New York
San Francisco

Washington
Pittsburgh

Chicago
St. Louis



Cross-seat safety car and longitudinal-seat two-man car at Williamsburg Bridge Plaza, Brooklyn

Here's a Pleasant Parallel for the Safety Car!

Operating Costs In Cents per Car-Mile

	Safety Cars	Other Cars	Saving per cent
Maintenance of way and structure.....	1.6	3.3	52
Maintenance of equipment.....	1.7	3.6	53
Power	1.9	3.8	50
Transportation	8.4	13.9	40
General	2.4	3.2	25
Total operating cost.....	16.0	27.8	42.5

(Table based upon results with more than 500 Safeties as presented by J. C. Thirlwall, ELECTRIC RAILWAY JOURNAL, Oct. 2, 1920)

Ask any experienced user of the Safety Car and he will tell you how much it has helped him to absorb higher expenses, not only through savings in operating cost but through gains of *new business*.

There is not a single branch of electric railroading from track to accident claims that has failed to benefit from Safety Car operation.

Bear in mind, please, that the foregoing results were obtained solely with the Safety Car equipped with our Safety Devices Combination in which

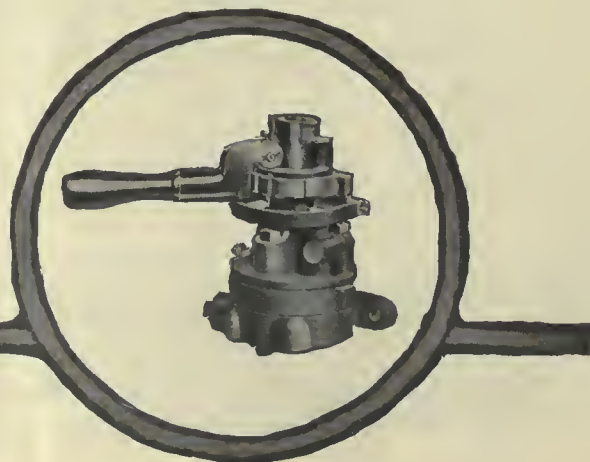
It is a Safety Car Only—

when equipped with automatic laborless apparatus, so interlocked, that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the airbrakes and sander applied immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the air brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company

Boatmen's Bank Bldg., St. Louis

Chicago San Francisco New York Washington Pittsburgh



Phono-Electric

in a New Haven Freight Yard



Freight yard movements are not fast, of course, but the switching of long, heavy trains demands large amounts of energy.

The ability of Phono-Electric contact wire to collect energy at high voltage without pitting, burning, fusing and corroding are among the

Many Sound Reasons for Its Use

Bridgeport Brass Company
Bridgeport Connecticut

O-B Catenary Materials —and Engineering Service

There was so much business going on between Miami and the mining field northeast that the Oklahoma, Kansas and Missouri steam road couldn't handle it satisfactorily.

Instead of bemoaning their hard luck the progressive shippers got together, bought the road and electrified it. And the Northeast Oklahoma Railroad pulled the heavy traffic electrically with ease.

Catenary overhead was designed by the O-B Engineers and O-B Materials were used. Electric Railway Journal said tersely "It is an example of how to put up overhead."

Close association of O-B Engineers with most of the important electrifications qualifies them to serve you in the design of overhead construction. Their knowledge and experience is yours—without obligation.

The Ohio Brass Co.
Mansfield, Ohio

New York
Philadelphia
Pittsburgh
Chicago

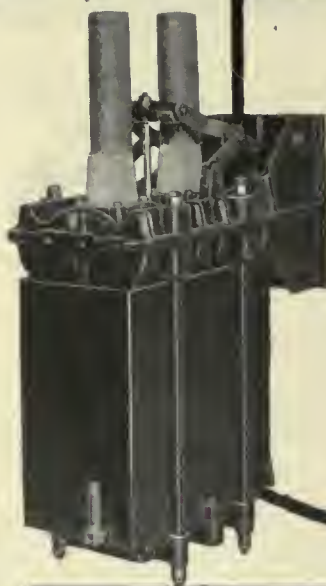


Los Angeles
San Francisco
Paris, France

Manufactures: Trolley Material; Rail Bonds; Car Equipment; High Tension Porcelain Insulators; Third Rail Insulators.



racking strains



Thousands of Times an Hour the heavy automobile, driven under tremendous momentum, hurls itself over inequalities of rough road surfaces that would rack to ruin the strongest chassis ever designed—were it not for the powerful cushioning effect of shock absorbers.

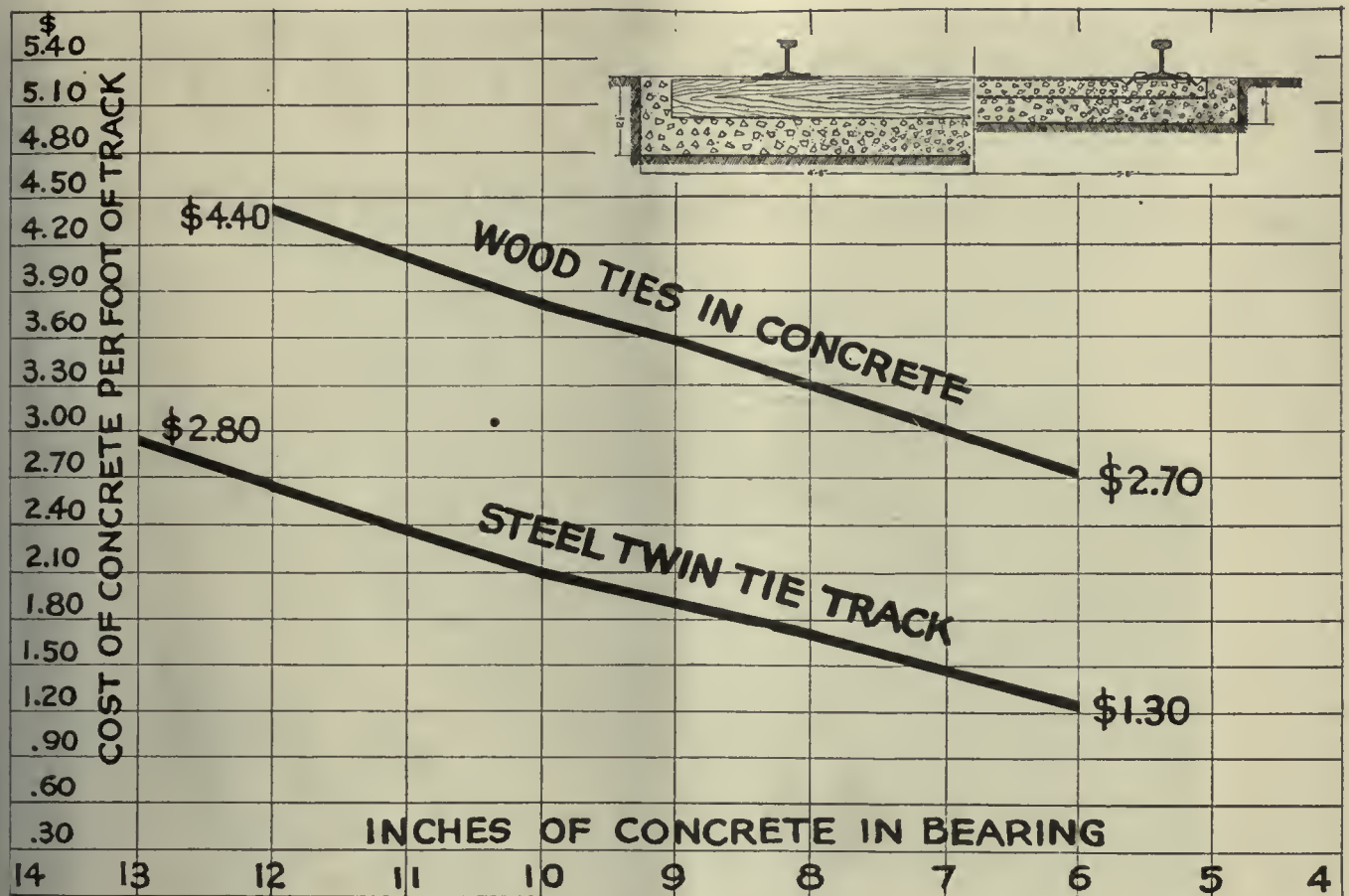
So it is with the CONDIT D-17 Oil Circuit Breaker. When the terrific rush of gas that accompanies the opening of a high-power circuit brings its bursting pressure to bear on the CONDIT D-17—it's the *resilient suspension* that takes up the shock and permits the gas to be eased out through cooling passages. This Resilient Spring construction protects not only the breaker itself, but life and property.

CONDIT ELECTRICAL MFG. CO.

Manufacturers of Electrical Protective Devices
BOSTON 27, MASS.

Specifications: 1, 2, 3 and 4 pole; cell mounting; hand and electrically operated; 500, 800 and 1200 amperes at 15,000 Volts; 500 and 800 amperes at 25,000 Volts.

CONDIT



Non-essential Concrete Costs More Than Steel Ties

IN conventional types of concrete track construction with wood ties, often *only 50 per cent* of the total cubic contents of the track foundation transmits the wheel loads from the tie to the subgrade.

The inefficient concrete between wood ties and at their ends is an economic loss when regarded as part of the track foundation.

The fundamental economy of Steel Twin Tie construction depends upon a more complete

utilization of the concrete in the track foundation than is possible with wood tie designs.

The comparative initial economy of Steel Twin Tie construction depends on the type of construction with which it is compared.

In order to determine the possible saving on your property, include a comparative estimate with Steel Twin Ties on the work your track department has up for 1921.

Price on Twin Ties at your delivery point will go forward by mail or wire at your request.

THE INTERNATIONAL STEEL TIE COMPANY, Cleveland, Ohio

International Steel Twin Ties manufactured and sold in Canada, by Sarnia Bridge Co., Ltd., Sarnia, Ont.

Steel Twin Tie Track

False Track Economy, Mr. General Manager

if you make the Maintenance of Way Engineer use a cheaper but inferior joint against his better judgment simply because the management is desirous of economizing—There is absolutely no economy if the joints cup or break.

THERMIT INSERT RAIL WELDS

1. Don't cup.
2. Their breakage is so small that it can hardly be computed in percentages.
3. They not only last as long as the rail, but, due to the absence of cupping, make the rails last longer.
4. They absolutely eliminate maintenance during the life of the rail.



*Send for
our latest
Rail Welding
Pamphlet 3932*

METAL & THERMIT CORPORATION

Boston
Chicago
Pittsburgh

120 Broadway



New York

Toronto
South
San Francisco



Write "KEYSTONE" on that next order

Signs, headlights, catchers, sanders, car signal systems, gongs and gear cases — all equipment which is of utmost importance in the building of a safety car.

The fact that these specialties used on the standard Birney Safety Car were chosen from the line of Keystone Car Specialties is a point for you to remember when buying safety cars.

Our Bulletin No. 167 shows many other specialties for use on safety cars — equipment which has been proven good and economical to buy.

Write for complete data.



ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA: 17th and Cambria Streets

NEW YORK: 50 Church St.

CHICAGO: Monadnock Building

Branch Offices: Boston, Scranton, Pittsburgh, Pa.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto



1921 Reasons for Specifying Flood City Trolley Line Specialties

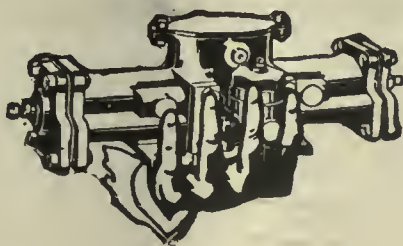
This is the year when conditions are relentlessly forcing costs down. It is imperative that you find the most *reliable* source of trolley line equipment—the kind whose superior quality proves cheapest in the long run. At your service is our staff of

FLOOD CITY

electrical experts, whose years of intimate daily contact with electric railway problems qualify them to handle your job to your everlasting satisfaction. Our broad manufacturing facilities provide highest quality equipment on an economy basis. Bushings, Bearings and Journals to any specifications.

Write for details

Flood City Mfg. Co.
Johnstown, Pa.

*Modernize!**Pneumatize!*

No Industry Can Stand Still

The first safety razor was such a marvelous improvement over the unprotected article that the most timid, nervous or awkward could become self-shavers.

Yet, under the stimulus of competition in this field there has come betterment after betterment—and no one would say that the end of such changes has been reached.

The first electric car was also a marvelous improvement over *its* predecessor, the horse car.

Then came the air-brake to make the car safer, faster and easier to operate.

And still later came those appliances of pneumatic and electrical character which supplemented the great work of the airbrake by completely eliminating all time-wasting hand labor by conductor and motorman, by completely eliminating all boarding and alighting accidents and by completely assuring the maximum time and attention for the collection of fare.

Those devices are embodied, of course, in

National Pneumatic

Door and Step Control
Motorman's Signal Lights

Door and Step Operating Mechanisms
Safety Interlocking Door Control

Multiple Unit Door Control

Which can be adapted in whole or part to make your cars embody the last words in fastest, safest, most economical operation.

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
50 Church St., New York
Edison Bldg., Chicago
Works: Rahway, N. J.

Save *from* \$2000 *to* \$6000



Description

Dayton Resilient Ties are made with two wood blocks imbedded in a cushion of asphalt, contained in iron boxes. These blocks support the rails and are fastened to them with bolts and clips. The bolts run through the steel angles, through the block and clips and hold all together with perfect security.

The iron boxes and blocks are tied together by two angle irons to hold the gauge of the track and serve as a reinforcement in the concrete. The joint tie provides more than double the bearing surface at the rail joint and has a steel plate for additional strength. This plate also acts as a welding base, eliminating the necessity of bonding.

The resilient wood and asphalt of these ties absorbs all the shocks and vibrations which directly cause the disintegration of the foundation, the heaving and settling of the joints and the resulting track failure.

DAYTON

on every Mile of New Track

If you can save more than \$6,000 a mile over wood ties in concrete foundation or—

If you can save more than \$2,000 a mile over wood ties in gravel ballast and—

At the same time get a better track than by any other known construction—

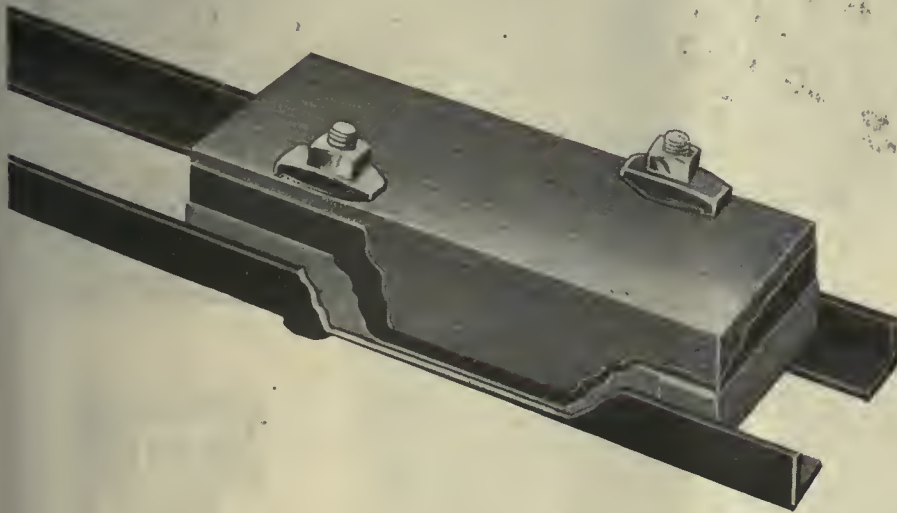
Why not go ahead and relay that stretch of bad track now?

Dayton Resilient Ties

1. Reduce first cost
2. Give longer life to track
3. Reduce track and paving repairs
4. Reduce upkeep of rolling stock
5. Reduce traffic noise

You want to save money on that next track job and you want to get a better track—have the absolute facts about track construction laid before you. Just tear off the coupon in the corner and hand it to your stenographer. It will bring to you complete literature on Dayton Resilient

Ties and tell you about the experience of others in the saving through their use.



The Dayton
Mechanical Tie
Company

707 Commercial Building
Dayton, Ohio

Resilient **TIE**

PIN TO LETTER

Dayton Mechanical Tie Company,
707 Commercial Bldg.,
Dayton, Ohio

Without obligation, please send me full information about your Dayton Resilient Ties.

In Railroad Service Everywhere

Each year sees Armco Culverts used in ever increasing numbers by the railways of the country. For railway engineers have been quick to realize the saving in time, labor and transportation and proven permanence when Armco Culverts are installed.

The accompanying illustrations show three installations made by important railroads, the second one being a rather unusual application. Twin Armco Culverts 209 feet long carry 600 second feet of water under the railroad tracks and under a state road to a property located beyond the highway. The upper and lower illustrations show typical installations of Armco Culverts on railroad rights of way.

Interesting and highly instructive engineering bulletins on drainage will be sent railroad and highway engineers on request.


There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting ARMCO CULVERTS and other products of Armco Ingot Iron such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

ARMCO CULVERT & FLUME MFRS. ASSN.

215 No. Michigan Avenue
CHICAGO



This triangular trade mark on culverts, flumes, siphons, tanks, road signs, roofing, etc., is your assurance of quality and permanence.



BATES Expanded Steel Poles

for St. Paul R.R. Electrification

Recently the St. Paul R.R. completed the electrification of 5 miles of its property, extending from Irving Park Blvd. to Howard St., Chicago.

The overhead construction employed on this project is of the catenary type supported on 6-in. top 35-ft. and 50-ft. Bates Expanded Steel Poles and steel mast arms. The mast arms supporting the overhead are made up of two pieces of $2\frac{1}{4} \times 2\frac{1}{4} \times \frac{1}{4}$ -in. angle irons, bolted together back to back with the pole and truss pins and spacing blocks in between the two angles.

Just north of the yard, on account of the long cross space necessary to provide for three tracks the heavy weight of the special work at that point, and short guy space, a bridge construction between Bates Steel Poles was employed. The photograph on this page illustrates this construction.

An interesting special case of pole setting was that used along the approach to the elevated structure and at certain other points. Here the poles were set in the ground adjacent to the concrete retaining wall, making necessary a 50-ft. pole. These 50-ft. poles were made up of three standard 25-ft. steel poles, two of which form the base, with the third as the upper part and supported by fastening to the top of the bottom sections. The two bottom poles were erected and riveted together side to side, with six rivets. The upper section was then held in place by means of two plates overlapping the top and bottom poles and riveted thereto with six rivets in each plate.

For complete data on Bates Expanded Steel Poles, write for a copy of the 1921 Steel Pole Treatise. It will be mailed free upon request.

BATES
Expanded Steel Truss Co.
208 S. La Salle St.
Chicago

Bates One-Piece Steel Poles



No Solder— Just a monkey wrench

The photograph shown was taken at the intersection of Waterloo and St. Jean Streets, Detroit, and pictures the M. O. power leads from the Howard Avenue sub-station. The larger cables, three in number, comprise the negative return system while the smaller cables comprise the positive system. Method of jump-ering feeders is by using cable tap type Dossert connectors 1,000,000 circ. mils size on the negative cables and 500,000 circ. mils on positive cables.

These Dossert connectors can be connected onto the jumpers and onto cables in fifteen minutes. The old method would take two hours. The labor saving on this job is one hour and forty-five minutes on each jumper.

The M. O. system is using Dossert connectors (cable tap style) on all feed-in spans with very fine results. The old method of removing feed span connections from feeder would mean unsoldering and un-serving wrap joint which would mean a delay of at least three quarters of an hour. With Dossert connectors the same job can be accomplished in five minutes.

Another method the Municipal Railway is utilizing Dossert connectors is by using temporary jumpers which means a very large saving factor.

(signed) E. W. Booth,
Superintendent of Lines

Dossert & Company
H. B. LOGAN, President
242 West 41st Street, New York

DOSSERT

Solderless Connectors

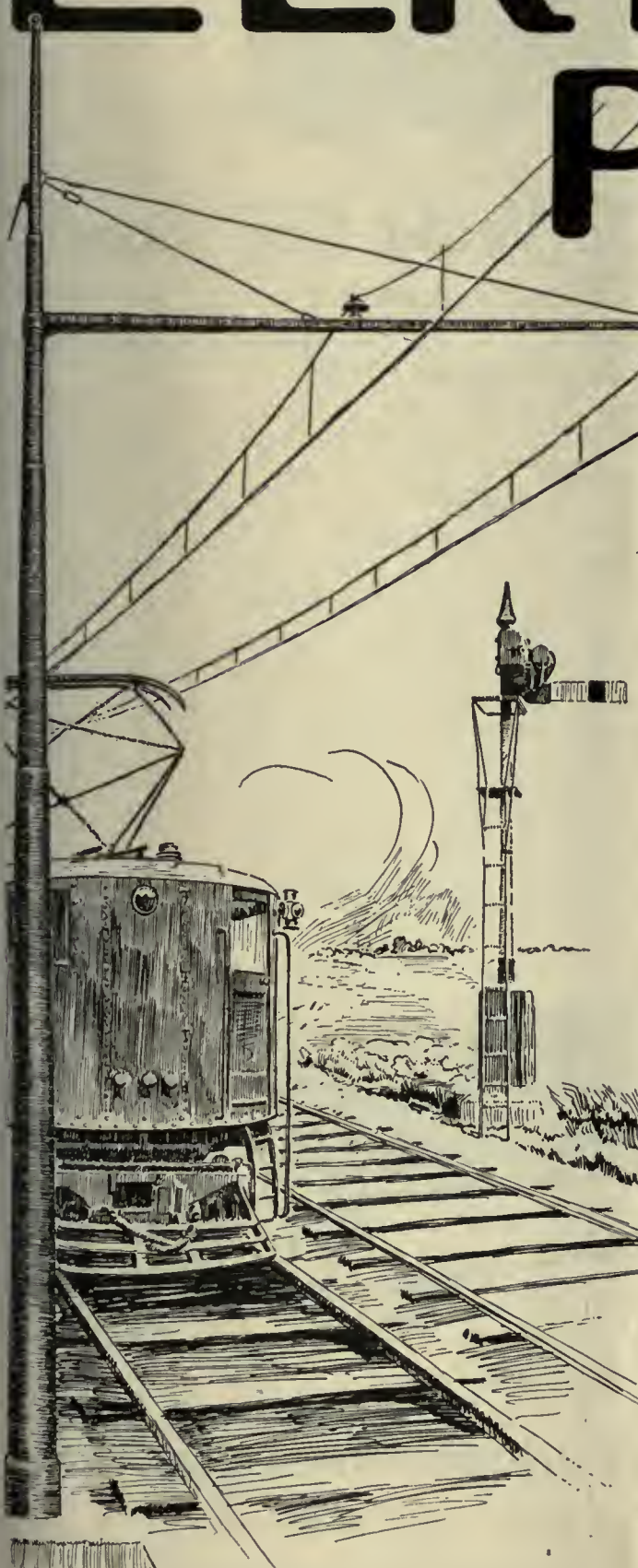
**Dependability
Economy in Installation
Efficiency in Service**

these are distinctively
Dossert characteristics

Send for Catalogue Fifteen

ELRECO Poles

~Now!



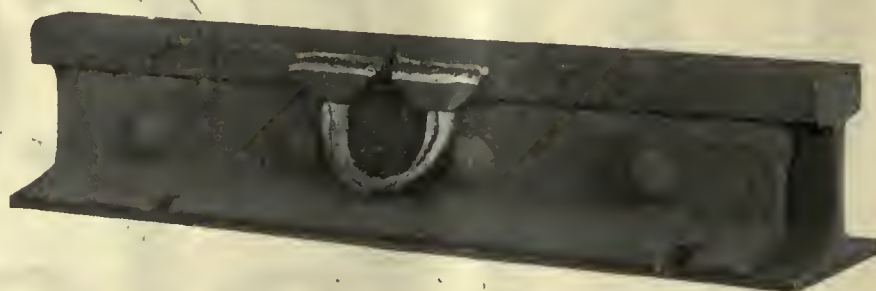
INTEREST is reviving in those long-deferred electrification projects, as well as in urgently needed renewals of electric line construction everywhere. Prices have dropped back to levels where you can again begin to consider purchasing something more than the bare hand-to-mouth necessities of maintenance.

Before specifying any other construction for overhead line work, investigate the possibilities of Elreco Tubular Poles. They combine neatness and compactness with strength and durability.

Whether your limiting factor is space, strength or economy, you will choose Elreco Poles. Prices back to pre-war levels.

**Electric Railway Equipment
Company**
Cincinnati, Ohio

Eastern Sales Office: 30 Church St., New York City



The Type AT-F Arc Weld Rail Bond

is made of two conductor flexible cable with

Terminals of Drop Forged Steel

into which the cable conductors are

Electrically Welded

The use of the heavy forged terminals prevents injuring the bond while welding it to the rail even when the work is done by an inexperienced welder.

The weld between the conductor and the terminal is made so that it may be easily inspected. The AT-F BOND may readily be furnished with various sizes of loops to meet any condition.

It is easily applied with any arc welding equipment or with the ERICO 600 volt, 200 amp., 100 lb., portable welding outfit.

Sample Bonds and Prices Sent on Request



100 lb. ERICO Portable Arc Welding Outfit

The Electric Railway Improvement Co.
Cleveland, Ohio



Cleveland Plays Safe—1500 of its Cars Now Equipped With N-L Signals

Electric Railway Executives are *shrewd buyers*. The money they spend for equipment *must pay dividends*—dividends in the form of increased operating efficiency, decreased operating costs or additional safety for car operators and the public.

That's why the adoption of N-L Indicating Signals by so many of the country's leading Electric Railways is in itself one of the strongest possible indorsements we can present.

Take Cleveland, for example. In Cleveland alone, 1500 street cars are now equipped with N-L Indicating Signals. Safe operation is thus made *safer*—operating and power costs are reduced—tail end collisions are *practically eliminated*.

In Buffalo, 130 cars are now N-L Signal equipped. Toledo is operating 350 of its street cars with these Safety Tail Lights—Akron, 125—Detroit, 50—Terre Haute, 25—and so on. And in addition to the large number of cars already equipped with N-L Indicating Signals they were *specified* for 450 more cars in proposals submitted *last month*.

All this means but one thing to the progressive Electric Railway Executive. It means that N-L Indicating Signals are here to stay—are fast becoming a *necessity* from the standpoint of the safe operation of street cars.

Isn't the proposition worth investigating, especially when such an investigation costs nothing and obligates you in no way? Write today for complete data.

The NICHOLS-LINTERN CO.

8404 Lorain Ave., Cleveland, Ohio

N-L INDICATING SIGNALS MECHANICAL SANDERS

Safety in Summer

The warm days of spring and the hot days of summer always bring out the happy, carefree troops of children that like to romp and run.

Every railway executive can keep his conscience clear and keep the kiddies happy by insisting upon the maximum front end protection for every car on his system.

Demand the utmost Safety on your property by insisting on proven devices for front end protection.

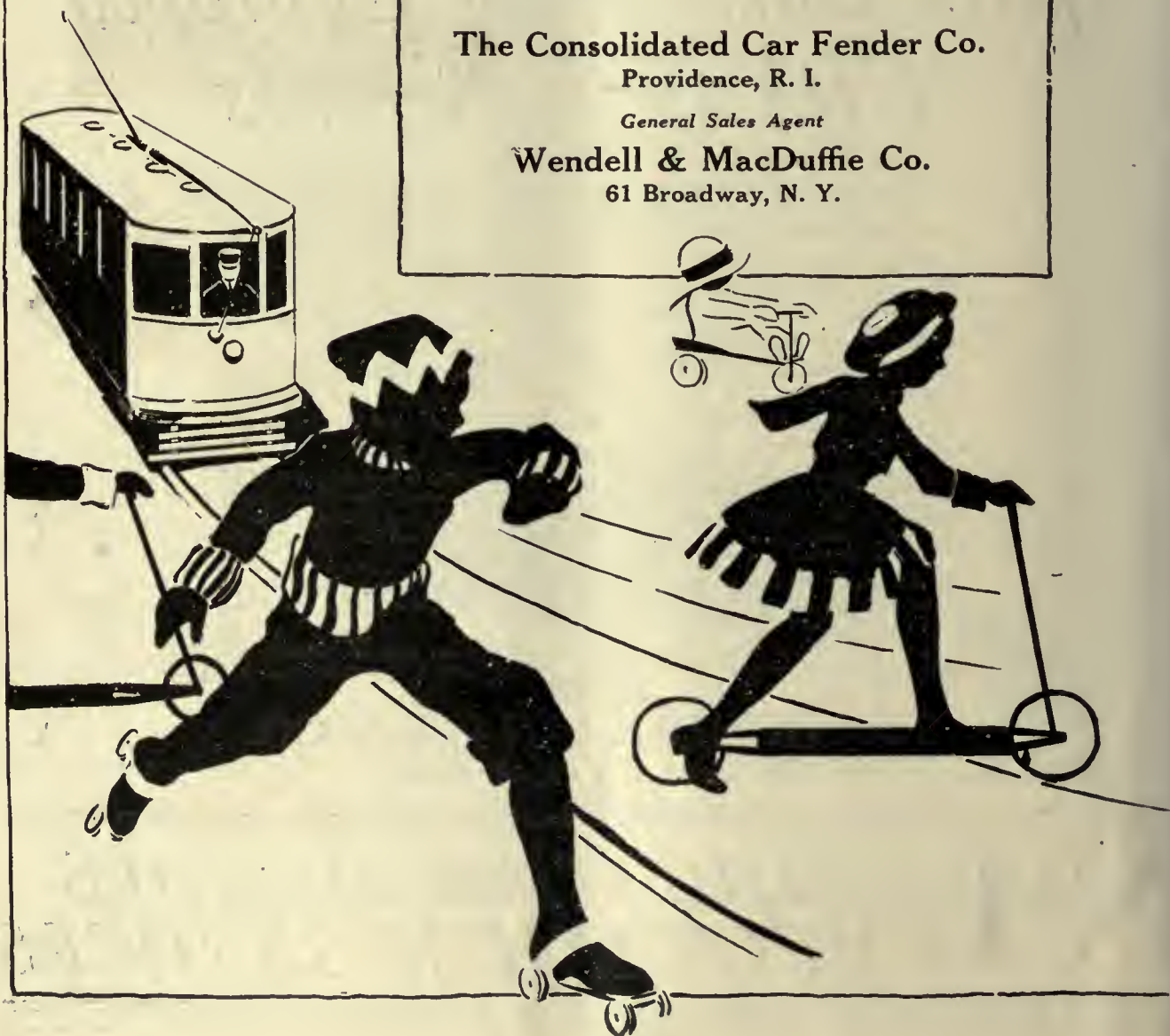
"Barrier of Safety" between the fallen pedestrian and the car wheels.

Save human lives by insisting upon H-B Life Guards.

The Consolidated Car Fender Co.
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Shanklin Transfer Machines Have Made Good on Safety Cars in Springfield, Mass.



A TRANSFER Every Second

during rush hour stops means minutes gained with resulting faster schedules.

No effort on the part of your operator is necessary. He merely taps a foot lever at the base of the machine and transfers are issued as fast as passengers appear.

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The cost of transfers has been reduced and the saving over daily dated transfers is more than 40 per cent. The expense of handling and checking is less. The last transfer issued constitutes the conductor's record.

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Shanklin Equipment Company, Inc.
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Forty years of specialization in bearings and bearing metals coupled with ideal production facilities have made Ajax Electric Railway products the safest—and cheapest-per-mile—on the market.

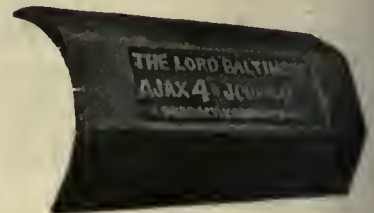
For his own protection every Master Mechanic should specify

Ajax Car Brasses Ajax Motor and Axle Bearings
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Better than babbitt for lining brasses
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Ajax Perfecto Check Plates will bend before they break.



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Quality is the foundation stone of Galena business—quality in oils and quality in service. Galena Oils are the recognized quality standard for railway lubrication, everywhere. As representatives of the oldest and largest lubrication organization in the world, Galena Service is in constant touch with the latest developments in railway work, and is further perfecting efficiency in the scientific lubrication methods that have already proved a most valuable aid to the railways in producing improved operation.

Therefore, the ever-increasing demand for Galena lubricants is but an honest tribute to merit daily exemplified by incomparable performance on the railways of the East, West, North and South.

*When Galena Service Goes In
Lubrication Troubles Go Out!*

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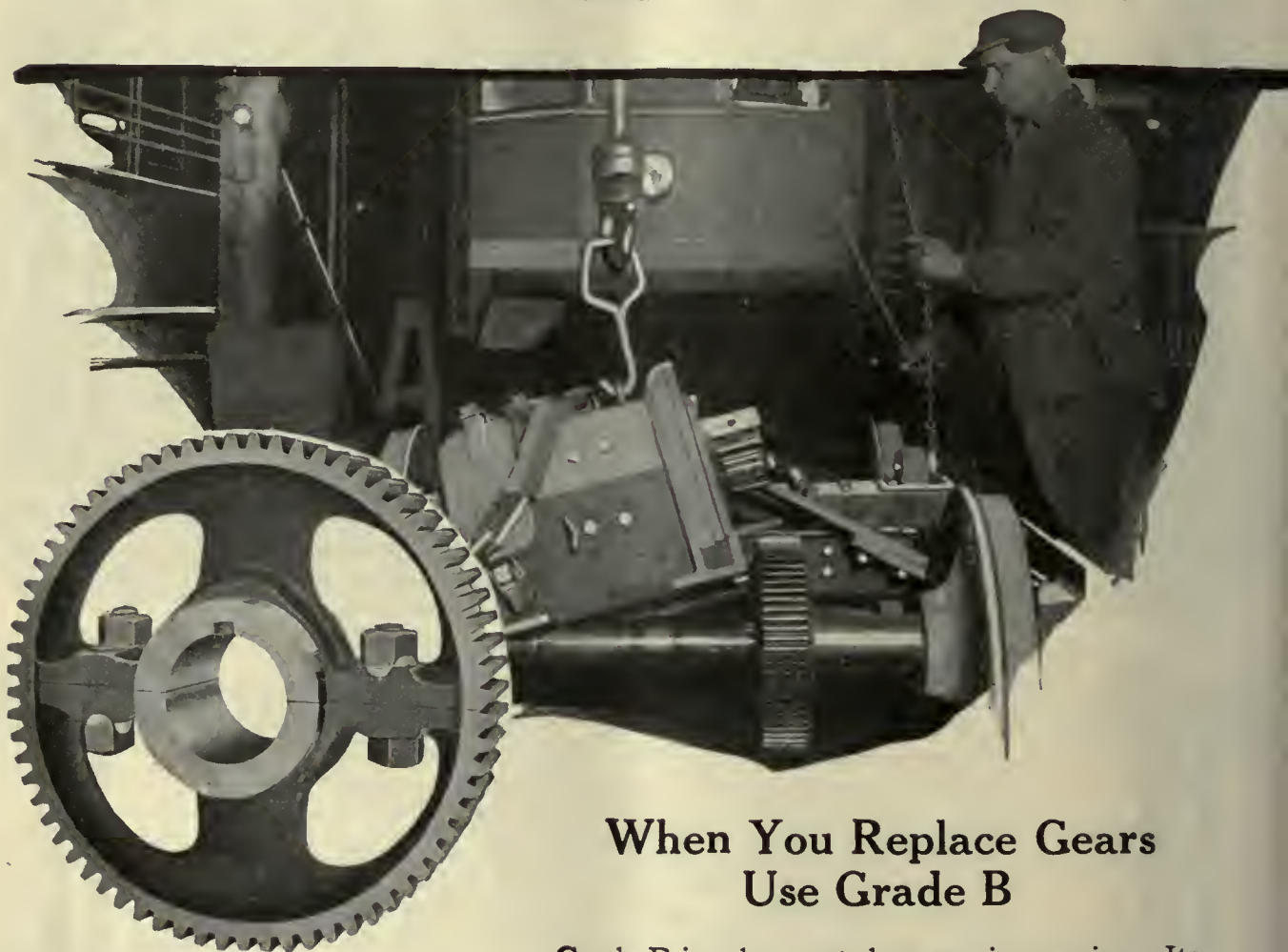
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The best is always most economical in the long run whether in the purchase of original equipment or of replacement parts.



When You Replace Gears Use Grade B

Grade B is a low-cost, long-service gearing. Its manufacturing processes are very similar to those employed in the making of Grade M but a carefully inspected cast steel blank is used in place of the forging used for the latter grade.

Grade B is the only gear that can be used successfully in mesh with a grade M pinion and it will give, on average service, as long wear as the Grade M.

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Electric Railway Journal

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Volume 57

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Number 24

The C. E. R. A. at Work and at Play

THE railway men who live in the territory covered by the Central Electric Railway Association are fortunate in having close at hand such wonderful recreational facilities as are provided by the Great Lakes. Moreover, they make good use of these in connection with the summer meeting of the association, to be held this year as two years ago on the good ship *South American*. To any one who has taken a C. E. R. A. boat trip, the mere name connotes several restful, sociable and informational days. Those who have not been able to do so have missed an interesting experience. This year the voyage begins at Chicago on Sunday, June 26, and ends at the same place on Friday, July 1, and not a month later than this as was inadvertently announced last week.

And there's a substantial program of papers, too—a good one. They will be read in the main salon, which makes an admirable meeting room, quiet, retired and cheery. It is easier to concentrate here than in meeting rooms of the type usually available.

After All, the Things that Count Are Results

SEVERAL incidents have recently come to attention which illustrate the importance of focusing interest on the ultimate end of an operation or process, rather than upon the means which are expected to achieve the desired results. For example, in one case a manager in referring to the head of a certain department said that he was forced to engage this man almost in spite of his prejudices because he knew that the man could do things. In another case, the head of an important department, in tracing his own career, said that he had frequently been obliged to antagonize his superiors, especially when they showed a tendency to interfere with his own prerogative, but that he had always held his job because those same superiors recognized that he could get results for them more reliably than any other man within their reach.

So much for examples of a positive character; now as to the negative side. There are far too many individuals who are so fond of their pet plans for doing things that the plans to them become an end rather than a means. The consequence is that the true end is never fully accomplished. One man comes to mind, a man with a very attractive personality and excellent educational training, who seemed to be so absorbed in systems for classifying information and people and in experimenting with new devices that he was not able to get out the work of his department in the required time. The source of the trouble would seem, in this case, to be the misplacing of emphasis as to relative importance rather than to any lack of real ability.

In considering the characteristics of various shops, way departments, power plants and the like, it is evi-

dent that in their operation these illustrate the working out of one or more fundamental principles. Those which show up the best on the whole are the ones in which the prime purpose is "results." It is not necessary to adopt that fallacious old adage, "The end justifies the means," to warrant one in keeping the end always prominently in sight.

Mr. Sprague Boosts the Joint Electrification Committee Idea

ON JUNE 2 Frank J. Sprague addressed the Traffic Club of Chicago on the general and local transportation situations. Outstanding in importance among the good points that he made was the need for some kind of a national body to study the problem of steam railroad electrification in a comprehensive way. Coming at the subject from a different direction Mr. Sprague reaches the same conclusion as that stated in the last annual report of the American Electric Railway Engineering Association committee on heavy traction, wherein the recommendation was made that the national associations concerned in railroad electrification get together in some kind of a joint committee. The committee will reiterate the recommendation this year. This paper suggested editorially, in the issue for Feb. 26, 1921, that the name "American Committee on Electrification" would be appropriate. Mr. Sprague calls the central body a "Commission," which implies a wider scope than "Committee" and fits in better with his proposition.

The idea of an American Committee (or Commission) on Electrification is the result of an evolution extending over a considerable period. Electrification of the railroads is so enormous and far reaching an undertaking that almost every important branch of engineering is involved in it to a greater or less degree. Then, of course, there are the transportation interests themselves, and, in addition, the present state of semi-management of the railroads by the federal government complicates the matter still more. All of this has resulted in extensive and increasing duplication of effort, which has worried the economy-loving engineers, and they have at least called attention to the overlap. They had in mind a co-operative movement largely among engineers. Mr. Sprague goes farther and takes in the Interstate Commerce Commission, the telephone interests and others not included in the earlier plan. There is no objection to this provided the body does not become unwieldy. With a strong and effective central organization the several divisions of the field could be handled by special sub-committees.

Mr. Sprague properly suggested that the initiative in this matter come from the American Railway Association. This is the body most vitally concerned, although the general public which needs better service, electric utilities which will sell the railroads power, manufacturers who will sell them equipment, and others are

greatly interested also. Mr. Sprague does not specifically mention the American Electric Railway Association in his list, but presumably includes it by inference. This body is the vehicle through which practically all of the experience in electric traction to date can best be brought to bear on the problem of electrifying the steam roads.

Can the Nickel Fare and the Graded Fare "Come Back" Together?

NEW items announcing decreases in street railway fares are becoming more numerous. A year ago such an occurrence was almost unheard of. Fundamental economic conditions over which the street railway companies had no control have rendered general increases in charges for transportation imperative during the last few years. The nickel fare has become almost extinct. Can it ever come back?

It has been well established by the statistics of the industry that the cost of labor, fuel and supplies, not to mention taxes and other items outside of strictly operating expenses, were more than doubled since 1914. Recent decreases have been but a small fraction of that amount. Yet only in rare instances have fares been increased proportionately. Therefore it is hard to foresee wherein there is any substantial ground for expecting a general return to the universal nickel fare in the near future. This is especially true in view of the fact that the nickel was not a very profitable rate to the majority of companies even ten years ago, though all companies then did not realize this fact.

It is not unlikely, indeed, that there are still further increases to be expected for some companies. Owing to public hostility and unfavorable franchises, some companies as yet have been unable to obtain simple justice promptly and are still seeking to secure rates which the higher costs of operation of today clearly justify. But the economic pressure appears to be receding somewhat, and there are various instances of companies reducing fares on their own initiative. Notable among such cases is the action of the trustees of the Eastern Massachusetts Street Railway, reported in last week's issue. On the many lines operated by these trustees a moderate general reduction in fares has been made coincident with a decrease in the wage scale.

To a long impoverished industry the mere mention of a 5-cent fare unit may sound too far fetched even to discuss, yet certain elements of the general public are discussing it, and one need only to pick up almost any copy of the more sensational newspapers to learn that they are "demanding" it. While it is not likely that the responsible authorities will be materially influenced by the "demands" of the unthinking and the sensation seeker, nevertheless it behooves all to be forehanded in considering these matters.

There are certain advantages to the old 5-cent nickel as a fare unit, not the least of which is the casual way the average American will spend it for a phone call, a soft drink or even a short ride on the street car, whereas he is probably a little more reluctant when the expense involves some extra pennies or the use of tickets, the supply of which he has to renew at frequent intervals at an expenditure of perhaps fifty cents or a dollar. All this leads up to a renewal of the old discussion of some system of graded fares, with the feasibility and desirability of a nickel unit for a short ride. Where a company is now operating on a fare of from 6 to 10

cents, and by means of current or future reductions in wages and other costs finds itself in a position to make some reduction in fare, but not to the extent that a universal 5-cent charge would require, the alternate plan of a low fare for a short ride with a higher fare for longer ride is worth consideration.

While several graded fare systems have been tried in the past, rather unsuccessfully to judge by their abandonment, it is obvious that the conditions are now much more favorable for such an experiment. Previous trials have all been made on the basis of the need of increased revenue, and the zone fares as established have always meant an increased fare to many, if not all passengers. But now, when a new set of conditions may permit a modified fare system on the basis of a reduction in fares to some, if not to a majority of the passengers, the chances of a successful return along these lines look distinctly better. Such an experiment, for example, being conducted by the Boston Elevated Railway, where a universal flat fare of 10 cents was the established rate for two years, but the company is now charging only 5 cents for short rides in several suburbs of Boston. The results of the first few weeks' operation are said to have shown an increase of more than 80 per cent in the class of riders affected. While it is pointed out by the general manager of that company that an increase of 100 per cent would be necessary to give the company the revenue formerly received at the 10-cent rate, nevertheless this remarkable percentage of increase is clearly indicative of the possibilities of stimulating short haul traffic by means of 5-cent fares.

The Committee on Elimination of Waste Makes Some Suggestions

MUCH has been said in the past about the waste prevalent in America, but the reference has usually been to the waste of national resources. That industry in America has also been a spendthrift—indeed, highly inefficient in its methods—will be a surprise to some. Nevertheless this is the charge of a committee of the American Engineering Council which declares that the aggregate of the losses at least theoretically preventable runs into billions of dollars yearly. This report was presented to the Council on June 3 and its publication was authorized not as a report of the Council but as the findings of the committee. A brief summary of some of the points covered is published in this issue.

It is somewhat remarkable that in spite of the progress made in industry in many directions, the methods of engaging labor and recompensing it differ but little from those practiced in the early days when men first began to hire their services to others. Methods in which the employer who needs a certain kind of labor can be brought in touch with the man who can supply that particular kind of labor have not greatly improved. The same can be said in regard to the determination of the peculiar adaptability of the man to the work to be undertaken and the prevention of his discharge because of seasonal or other changes in the demand for the product, preventable diseases, idleness through strikes and other causes. For some of these conditions the employer is to blame, for some the employees, but for the most the cause is conditions which community sentiment and intelligence only can overcome.

The electric railway industry should profit both directly and indirectly by any comprehensive plan for increasing the efficiency of labor, reducing unemploy-

ment and otherwise increasing output. The indirect advantages include lower cost of living and greater prosperity for the community, and this necessarily means more riding. The direct advantages of increased labor efficiency are those which would apply in any business, namely, greater output per unit of cost.

The report is particularly interesting because it is an examination by an engineering body of a subject which usually has been approached not from the engineering but from the sociological side. The characteristic of engineering reports is that they deal with things in a concrete way, with definite figures, quantities and values. The committee has evidently made an effort to extend engineering methods to this particular study, and its remedies partake of an engineering nature. Thus it urges the extension of the engineering idea of standardization to such industries as the ready-made clothing industry and the printing industry, the compilation and dissemination of statistics relating to unemployment and employment needs, the scientific study of the adaptation of laborers with certain defects to their most suitable tasks and an effort to secure a reduction of seasonal fluctuations in output. The electric railway industry is founded on engineering, and the success of any attempt to extend engineering methods to other industries will be watched with interest by railway men.

The Value of Adequate Records Is Strikingly Emphasized

ONE of the principal contributing factors in minimizing the expense of the valuation of the property of the Connecticut Company by the Connecticut Commission (see *ELECTRIC RAILWAY JOURNAL*, May 21 and 28) was the fact that the engineers of the commission were able to base much of this work on the records of the company. This is certainly evident from an examination of Mr. Knowlton's analysis of the valuation. As remarked in the May 28 issue, this was not a weakening of the method but rather a strengthening, and it is most certainly a telling argument in favor of railway companies keeping their property records in such form that they will lend themselves to an easy and accurate analysis of the entire physical plant.

The problem of keeping property records and accounts has never been solved to the satisfaction of all who have ideas on the subject and probably never will be, but it is certainly evident that material progress has been made since the value of some sort of record began to be appreciated. Usefulness in possible, or probable, valuations is by no means the only reason for keeping such records, though the money saved for the company, in addition to that saved by the state, in one valuation might conceivably cover the entire cost of keeping the records in such shape as to be useful in such contingency. Certainly, in the continuous maintenance and reconstruction of the property of a system of any size, detailed records should prove invaluable, especially

in the case of changing personnel where previous records are the only source of information to new officials.

Returning to the use of adequate records in valuation proceedings, it can hardly be denied that an accurate and up-to-date record of physical plant is a strong argument for a commission's engineering staff to use company data at a great saving of expense to all concerned. On the whole, it should be much more accurate in most details than any field inventory could ever be. In the case of track, ties, ballast and pavement, wire sizes, even, special trackwork and many other items, a record of what was installed and still exists gives more information than can easily be obtained by field examination.

Company and commission co-operation in making valuations, among other things, is getting to be more and more common. Ideas for making this co-operation most effective and mutually advantageous should therefore be welcome. In this case the concrete evidence of the value of complete records should be an incentive to railway executives to investigate their own record system with a view to its completeness and its usefulness and value in dealing with commissions and others.

Some Electrification Object Lessons from Abroad

IT HAPPENS, at the moment, that the focus of interest in electrification is shifted away from the United States to foreign lands. Although comprehensive plans are in preparation here and much important work will be done within a few years, little actual electrification can be carried out until the railroad situation clears a bit. Meanwhile a high-grade pioneer installation has been made in Brazil on which operation will soon begin, construction work is being pushed in Switzerland, and in England, and on the Continent of Europe nation-wide plans are being made. India and South Africa are also being heard from. The reduction in the cost of coal there, together with scarcity of funds, has acted to slow up the actual placing of contracts, but the urgency of early adoption of electric power is still keenly felt.

These circumstances render peculiarly timely the publication this week of several articles containing firsthand information of the Paulista electrification and the situation in Europe. From these it is evident that the electrified railroads in this country are largely in the lead in this field. The Paulista has adopted American apparatus and methods, so that the installation on its Campinas-Jundiahy section can hardly be considered foreign.

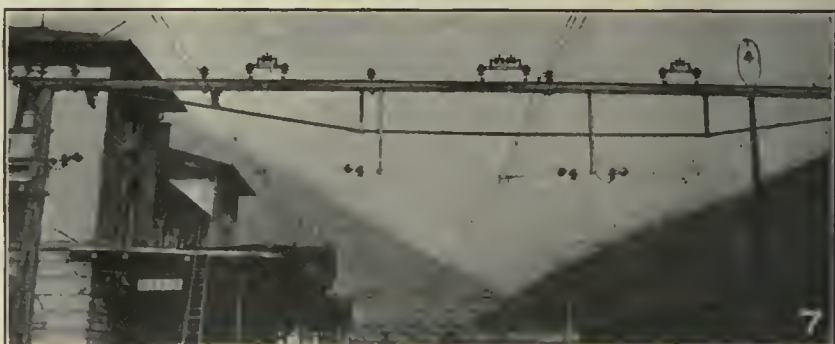
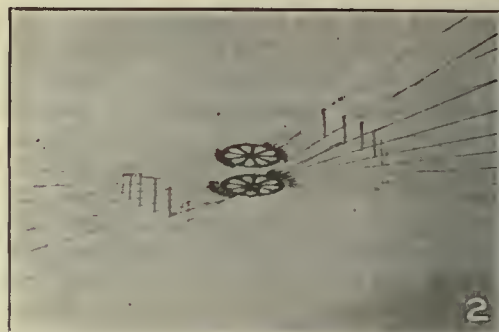
Across the Atlantic operating conditions are so different from those in the United States that comparisons can only be made with difficulty. However, able engineers and transportation men are vigorously at work there and real progress is being made. Their solutions of their problems will be of service here. And they are learning that the most economical carrying of at least certain kinds of freight involves the use of heavy tonnage trains.

Quotation from the Federal Electric Railways Commission Report

No. 24

THE undisputed testimony favors an indeterminate franchise by which the company is permitted to operate subject to the right of the public to take over the property by paying its value or agreed price. Such contracts protect both the investment against confiscation and the public against extortion by providing for payment of just compensation for the use of the property. The indeterminate franchise has been most thoroughly developed in the State of Wisconsin, and it has been recognized in the District of Columbia and the States of Indiana and Massachusetts. Its earlier adoption by other states and communities would have prevented many conflicts and misunderstandings. We believe that this form of franchise should receive the favorable consideration of the public.

Features of Overhead and Other Electrification Details in Switzerland



1—Some 750-volt, direct-current trolley construction on Bernina Bahn.
 2—11,000-volt trolley over turntable in roundhouse, Landquart, Rhätische Bahn.
 3—11,000-volt switch in roundhouse at Landquart, connecting across section break shown in the following figure.
 4—11,000-volt trolley anchor and section break at roundhouse door.

5—15,000-volt, single-phase locomotive and yards at Spiez, Lötschberg Railway.
 6—11,000-volt, single-phase trolley construction at station, Rhätische Bahn.
 7—15,000-volt, single-phase trolley construction at Blasca, St. Gotthard Line.
 8—Hydraulic power plant at Kandergrund, which under 985-ft. head generates 15,000-volt, 15-cycle, single-phase power.

Railway Electrification in Europe

BY J. V. DOBSON AND F. E. WYNNE*



A 250-HP., 5,000-VOLT, 20-CYCLE, SINGLE-PHASE LOCOMOTIVE ON THE LOCARNO-PONTEBROLLO-BIGNASCO RAILWAY, SWITZERLAND

The Authors, Recently Returned from a First-Hand Study of Transportation Conditions in England and on the Continent, Have Set Down Their Impressions of Present Practices and Tendencies in This Field—They Summarize the Points of Difference Between American and European Railway Usage

A FEW months ago the writers had occasion to make a trip through the European countries in which railroad electrification has made substantial progress or in which there is a promising field for development in this line. In the course of their travels, covering a period of two months or more, they visited England, Norway, Sweden, Germany, Switzerland, Italy and France. Some observations made on the tour are set down in the paragraphs below. Before taking up in detail the conditions noted in the several countries respectively, a summary of some of the points of novelty in railway practice, considering the trip as a whole, may be of interest. These items refer to practices noted in one or more places. They do not necessarily imply general tendencies.

SOME TRANSPORTATION FEATURES THAT ATTRACTED ATTENTION

The points of detail which we noticed particularly were these:

1. The double-deck street car for large cities.
2. The bow trolley for street cars.
3. Ball and roller armature bearings for street-car motors.
4. Rheostatic braking for street cars and locomotives.
5. The system of zone fares.
6. The three-car unit for suburban service.

7. Control equipment mounted within the car body.
8. Separate generators and transmission for heavy railway power supply.
9. Low frequency for alternating-current motive power.
10. Fifteen thousand volts on single-phase contact lines.
11. Four-thousand-volt direct-current system.
12. Tension devices, automatic or semi-automatic, for overhead contact lines.
13. Oil-cooled transformers on single-phase locomotives.
14. Regenerative braking on single-phase locomotives.
15. Manually operated control of locomotives.
16. Plate frames for locomotives.
17. Rod drive for moderate speeds.
18. Light axle-loading on cars and locomotives.
19. Light draft gear on cars and locomotives.
20. Strict observance of specified limits in loading and speed of locomotives.
21. Passenger train-heating plant not carried on electric locomotives.
22. Quality of workmanship in both manufacture and maintenance.
23. Track rails supported in chairs.
24. Permanent character of roadway structures.
25. Artistic designs of railway buildings.
26. Light-weight cars, freight and passenger.
27. Open-top freight cars for all kinds of loads.
28. Freight cars with brakes for holding only.

*Mr. Dobson is section engineer, alternating-current railway motors, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., and Mr. Wynne is manager of the railway equipment engineering department of the same company.

29. Freight cars with hand brakes only.
30. Vacuum brakes.
31. High speed of freight trains.
32. Side door compartment type passenger cars.
33. Ticket retained by passenger throughout journey.
34. Strict enforcement of laws against trespassing.

The inclusion of a practice in the above list does not indicate an opinion that it is adaptable to American conditions. Many of them, however, deserve serious consideration.

ENGLISH RAILWAYS ARE WELL BUILT

One of the most noticeable features of the English railways is the excellence of the roadbed. The track is well ballasted and well drained. The rails are carried on chairs and held tightly by wooden wedges between one side of the chair and the rail. There are practically no grade crossings, the roadways usually being carried on bridges above the railway track. Where these bridges are not entirely of stone, they are supported from heavy masonry piers with masonry wings for retaining the fills on the approaches. Of course, the roads are on private right-of-way, and the laws against trespassing are very strict and rigidly enforced.

The cars are of exceedingly light construction, most of them having only four wheels and two independent axles. Some of the later and longer cars have six wheels on three independent axles, and there are some double-truck cars. The maximum capacity of a freight car is approximately 20 long tons. The majority of the freight cars are not equipped with brakes except for holding when standing on a grade, and these brakes are set up by the crew passing along the side of the train and throwing them to the desired position. Others of the cars are provided with hand brakes operated from a small cab on the end of the car. Standard Continental couplings are used, consisting of hooks and links. Except in a few cases, the maximum working drawbar pull for this type of coupling is approximately 38,000 lb. Many of the cars are similar to our gondola type without tops. Freight which might be damaged by the weather when loaded in such cars is protected by tarpaulins drawn over the top of the load and down over the car sides. This practice greatly facilitates the loading and unloading of cars and was found to be a valuable factor in securing the rapid movement of freight during the war.

COMPARTMENT CARS ARE STANDARD

Passenger rolling stock is, of course, of the compartment type with side doors. At present, the railways are giving only first class and third class service. The cars used for third class service have the compartments extending all the way across the car with a door opening from each side. Those used for first class service have a corridor running down one side of the car, one door from each compartment opening into this corridor, and the other door located in the opposite side of the car.

In both passenger and freight service the train weights are small in comparison with those common in American main line traffic, but the speeds are high. A great many passenger trains are operated at speeds comparable with our fastest trains and the average freight train speed is considerably above ours. Interesting features of steam locomotives are the protected drivers, the use of inside rods and cranked axles, low fire boxes and small coal bins, particularly on switching engines.

In England there are no heavy electric locomotives.

At present the Northeastern Railway is designing a trial locomotive of the 4-6-4 type which will weigh approximately 105 long tons with a one-hour capacity of 2,500 hp. and a maximum speed of 90 m.p.h. This engine will have quill drive, designed after Westinghouse practice, and will be given its preliminary test on the 1,500-volt, direct-current Shildon-Newport line.

There is a large amount of suburban electrification terminating in London. These are 600-volt, third-rail, direct-current installations, with the exception of the 6,600-volt, 25-cycle, single-phase system of the London, Brighton & South Coast Railway. The tendency in suburban electrification is toward three-car units, comprising one motor car with a quadruple equipment and two trailers, and with only two control stands, one at each end of the three-car unit. In the motor cars, the general practice is to mount the control equipment in a compartment immediately back of the motorman's cab and to have a baggage compartment just back of the equipment room. Generally, doors are provided between the equipment room and both the motorman's cab and the baggage compartment, providing ready access to the electrical apparatus for inspection and repair.

The preference of railway engineers seems to be for electro-magnetic control rather than electro-pneumatic. This is influenced greatly by the brake situation as vacuum brakes are much more common than the compressed air brakes.

SINGLE-PHASE OVERHEAD ON LONDON, BRIGHTON & SOUTH COAST RAILWAY IMPROVED AS TO FLEXIBILITY

On the London, Brighton & South Coast Railway the overhead is the double catenary type similar to the initial installation on the New York, New Haven & Hartford Railroad, although somewhat lighter. Recent modifications of the initial construction include: (1) The securing of flexibility by means of clips having stems passing through openings in the fittings at the bottoms of the hangers, thus permitting free vertical movement. (2) The omission of the horizontal member of the triangle which initially connected the two messenger wires.

This company has also devised a method of satisfactorily using the spool type of insulator, which at first gave trouble. The scheme is to mount the spool on a metal sleeve with tow between the spool and the sleeve and having the supporting member passing through the sleeve. The tow gives a cushioning effect, permitting unequal expansion of the porcelain and metal without producing destructive strains in the porcelain.

The London & Northwestern Railway, in combination with the Bakerloo Tube, gives a combined subway and suburban service, each of the railways furnishing part of the equipment. This is a very convenient scheme for suburban passengers living along the line of the Northwestern, as they get direct service from down town to their own stations. One of the first features of street traffic noticed in England is the general use of double-deck cars, some of which have the upper deck inclosed, while others have the open upper deck similar to the bus. The bus service in London is really remarkable for its convenience, frequent service, speed and amount of traffic handled.

After observation of the operation of these vehicles through the crowded, crooked and hilly streets of London, it is evident that they give a class of service which could not possibly be approached by street cars.

As an indication of their flexibility, one frequently notices at street crossings, where the street is wide enough, three or four of these buses drawn up, side by side, waiting for the traffic officer's signal to go ahead. This is a great advantage over the necessary series position of street cars under similar circumstances.

In addition to the gasoline buses, there are now a number of gasoline-electric buses of somewhat larger capacity and which may prove to be more economical than the straight gasoline vehicles.

NORWAY IS RICH IN POWER

There are several interesting electrified railway propositions in Norway. Leaving Bergen, the Christiania-Bergen line of the Norwegian State Railways follows along the mountains beside a fjord for some distance and then continues to climb up the west slope of the main backbone of Scandinavia. The road is crooked and steep and passes through many tunnels and snowsheds. In the more rugged part of the country the roadway is not fenced. The condition of track is fair, although not to be compared with that of most English railways.

Of course, it is more difficult to maintain a good road-bed in Norway than it is in England, because the former country is subject to much wider temperature variations and a great quantity of snow.

The structures, bridges, tunnels and snowsheds along the right-of-way are of substantial character. Cars and locomotives are of the standard light construction used throughout Europe.

The traffic is comparatively light, as is indicated by the fact that only two passenger trains each way daily are operated between Bergen and Christiania. It is proposed to electrify at least the mountain section of this line as soon as it is convenient to finance the project. The features which tend to promote electrification throughout Scandinavia are that all coal must be imported, and there is abundant water power which can be readily developed. The total available water power is said to amount to 4 hp. for each inhabitant of Norway and Sweden. It is thought that the density of traffic is insufficient in itself to justify electrification.

In Christiania the street cars are mostly of the single-truck type with hand control and bow trolley and operate at the usual city speeds. The operation of the bow collectors is excellent and this is noticeable wherever this form of collector is used for street car service in Europe.

An interesting suburban installation is the Holmenkollen Railway, which starts in the outskirts of Christiania proper at a station having special provision for handling enormous crowds during week-ends and on holidays. These cars are equipped with Westinghouse motors and HL control built at East Pittsburgh. They are large, double-deck, center-entrance cars of modern design. A novel feature of these cars is that the outside is provided with hooks and straps for transporting up the hill the sleds and skis of the passengers who use these primitive vehicles for the descent by way of a steep, crooked, picturesque forest course. The regular schedule on skis is 7 miles in eight and one-half minutes.

The Christiania-Drammen line of the Norwegian State Railways is now being electrified for operation at 15,000 volts, 15 cycles, single-phase, with locomotives having side rods and geared series motors. The overhead construction will be practically the same as that

which has proved its excellence on the Kiruna-Riksgränsen line of the Swedish State Railways. Power will be secured from a hydraulic plant which is one of a number to be included in a general plan of electrical generation and transmission. Probably the next step in Norwegian electrification will be the line between Riksgränsen and Narvik, 25 miles of continuous 2.6 per cent grade.

The principal traffic will be handling the cars loaded with iron ore down the grade to Narvik, which is an open port all the year, being under the influence of the Gulf Stream. At Narvik, the trains are run out on an elevated structure where the ore is dumped into vessels for transportation to England and western German ports.

It is probable that regenerative control will be required on the locomotives for this service. The general impression received in Norway is that their electrification will proceed under the guidance of competent engineers as rapidly as the necessary funds can be secured.

OVERHEAD CONSTRUCTION WELL DEVELOPED IN SWEDEN

Railway service between Stockholm and Riksgränsen is given three times per week by a mixed passenger, baggage, mail and freight train.

This railroad employs the European standard equipment. The road is good, the structure substantial and the speed moderate. The electric zone now extends from Riksgränsen to Ripats, 155 miles, and is being prolonged from Ripats to Lulea, 115 miles. The hydraulic plant at Porjus, located 34 miles from the main line, furnishes all the electric power in northern Sweden. This novel power house has been described previously in the *ELECTRIC RAILWAY JOURNAL*.

The present development comprises four 12,500-hp. turbines, two of which drive single-phase, 15-cycle generators, one drives a 25-cycle, three-phase generator and the fourth drives two spare generators, one of each frequency.

This power house is being extended and development is under way to provide for a total of 60,000 hp. at this point. The most impressive feature of the entire power station is the great amount of space; nothing is crowded and clearances are ample. This is true of the substations also. A novel feature is that all the control wiring of the power house is lead covered and carried on open racks just under the ceiling of the lower rooms.

The three-phase power is transmitted at 70,000 volts for industrial purposes. The single-phase transmission for railway service is at 80,000 volts with the middle point grounded.

In the design of the transmission lines, more than normal sag is provided for the purpose of keeping the stresses within reasonable limits under the wide temperature variations and the great weight of frost frequently present during the winter.

The trolley line construction is a remarkably good piece of work. The supports are light structural steel poles on open line and similar bridges in yards. Foundations are concrete. Insulators throughout are porcelain. All fittings are bronze. Both contact wire and messenger are copper, as are the flexible hangers.

The line is divided into sections averaging about 0.85 mile in length. Contrary to American practice, the sections are not anchored, but at each end the trolley and messenger are brought together and carried over pulleys to movable weights running in guides in the



A 55-TON, 560-HP., 4,000-VOLT DIRECT-CURRENT LOCOMOTIVE ON THE TORINO-CIRIÉ-VALLE DE LANZO RAILWAY, ITALY

special poles at these points. The bracket arm consists of three members arranged in form of a Z, supported at the left on two pin-type insulators and at the right supporting the messenger and trolley. The insulator pins are free to rotate about the vertical axis. The entire construction is light, flexible and reliable and its record indicates its suitability for the severe climatic conditions. In eight years of service there have been only four cases of broken trolley wires, although the temperature varies from plus 100 deg. Fahr. to minus 70 deg. Fahr., and the frost on a single wire at times weighs 1 lb. per yard.

The maximum wear on the contact wire occurs where the overhead changes grade relative to the plane of the track and shows a maximum flat of less than 0.1 in. This construction could be studied with profit by American engineers and deserves a service trial. If successful under our conditions, it would assure great economy in one of the most expensive elements of railway electrification.

Following exhaustive studies, which were begun prior to the electrification, and experimental variations in the system of distribution during operation, the Swedish engineers have concluded that the best way to correct interference in the parallel communicating circuits along this line is to use track transformers in conjunction with stub-end feed each way from each substation, the track as well as the overhead being sectionalized between substations.

The freight cars and trains on this road are the heaviest operated electrically in Europe. The double-truck ore cars weigh over 12 short tons each and have a capacity of 39 short tons, which gives a loaded car weight comparable with that of many American box cars. These cars are made up into trains of 1,500 to 2,000 tons and operated over a rolling profile with a maximum grade of 1 per cent. The line electrification is being extended to the East and in this direction loaded trains will be moved with the aid of a helper up a maximum grade of 1.6 per cent. Several types of locomotives are in service, the largest weighing about 138 tons and having a maximum starting capacity of 2,500 hp. The draw-hooks of these cars and locomotives are special, being heavier than the standard Continental type and good for a maximum operating pull of 55,000 lb. This seems small in comparison with our draw-bars, but is a substantial advance beyond general European practice.

To provide steam heat for passenger cars of the electric zone, a special car carrying the heating equipment and supply of fuel and water is attached to the train. Thus, the electric locomotives are relieved of the handicaps incident to carrying train-heating equipment in the locomotive cab, which has been American practice.

It is interesting to note that on this railway the motive-power department can order a locomotive off the road for inspection or repairs without regard to the demands of the transportation department.

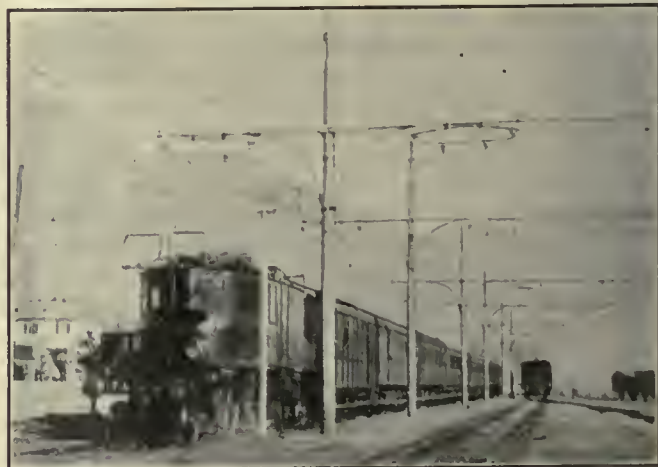
The impression produced by inspection of the Swedish State Railways electrification is that their engineers have carried through a large amount of valuable research and original design, and further notable contributions to the art of railroad electrification may be expected from this source. It is likely that the next electrification undertaken will be from Stockholm to Gothenburg.

GERMAN DEVELOPMENT HAS BEEN DORMANT

Although considerable work has been done in the last two years toward getting the German roadbeds and equipment in workable condition again, they are yet in great need of repairs. Much progress has been made in rebuilding locomotives, a large part of such work being done in the locomotive shops of electrical manufacturers. The car repairs have not been so extensive, being largely confined to the trucks; the bodies need paint, windows and doors are loose, and many of the fittings are rough iron where they were originally brass or copper. On some electric lines, the trolley wires, which were removed several years ago, have been replaced and electric service has been resumed.

Apparently, electric railway development until recently has been dormant since 1914. Some locomotive orders taken in 1913 are just being completed substantially in accordance with the original designs. However, it is noteworthy that these locomotives have commutating-pole, series, single-phase motors. This general type in a variety of forms is now the standard single-phase railway motor of Europe. There are no high-voltage direct-current railways (3,000 volts or more) in Germany. For street car service both split and box-type motors are being manufactured, but the tendency is to standardize on the box type as has been done in America.

Armature bearings of the roller type are popular and for the very small railway motors there is a tendency toward ball bearings. The inspection of several types



TYPICAL 3,300-VOLT, 3-PHASE LOCOMOTIVE AND OVERHEAD CONSTRUCTION, ITALIAN STATE RAILWAYS

of locomotives under construction indicated that cab construction, equipment layout, motor mounting and method to drive are yet considered to be in the experimental stage and subject to much further development. The impression gathered from seeing the quantity of railway equipment now building, and the diligence displayed by the workmen, is that German competition with all other countries will be very keen in the near future.

ELECTRIFICATION WORK IS ACTIVE IN SWITZERLAND

Switzerland is particularly interesting, not only on account of its magnificent scenery but also because of the extent to which its railways have been electrified. The locomotives and cars are well built and maintained and the roadbed is good. Throughout Europe the great pains taken to build for permanence is striking, and in Switzerland this is emphasized by the enormous amount of labor required to overcome the natural handicaps to railway construction.

The mountainous nature of the country, of course, makes it necessary to build the railways with many grades, long and steep. The result is that no especially high speeds were observed; but on the other hand, the speeds of both passenger and freight trains on the

Long tunnels are numerous, the Simplon (13 miles) being the longest in the world. This will ultimately be a twin tube tunnel. The second bore is now approaching completion.

Most of the Swiss railway electrification is at 15,000 volts, 15 cycles, single-phase. However, between Bergdorf and Thun there is a three-phase line with locomotives and motor cars. The Rhätische Bahn is an 11,000-volt, single-phase line. The Bernina Bahn operates at 750 volts direct current, entirely with motor cars (with magnetic track brakes) and trailers, except for one freight locomotive. At Locarno there is a light railway, 20 cycles, single-phase, which has been operating for fifteen years. It uses 800 volts on the trolley in town and 5,000 volts in the country. The collector is a whip of pipe section, operated by a clock type spring and does very well at the low speeds.

Of course, all of the later installations use the catenary type of overhead. That on the Lötschberg Railway and Rhätische Bahn is heavier than the Swedish construction, but somewhat lighter than ours, while the St. Gotthard Line uses a light form of compound catenary and rather heavy supports, more comparable to American practice. All three of these roads



TWO VIEWS SHOWING TYPICAL FREIGHT CARS AND LOADING IN NORWAY

heavy grades are higher than in America. For instance, on the Lötschberg Railway the regular speed up a grade 50 per cent steeper than that on the Pennsylvania Railroad from Altoona to Gallitzin is 35 m.p.h. and on the 3.5 per cent grade of the narrow-gage Rhätische Bahn the up-hill speed is 20 m.p.h. Another result of the ruggedness of the country is that the only way grades can be kept within reason in many places is by winding back and forth up the side of a mountain, constructing spiral loop tunnels within the mountains, and crossing back and forth between the sides of the gorges. On the St. Gotthard line of the Swiss Federal Railways there are seven spiral tunnels between Erstfeld and Bellinzona, a distance of 68 miles. On the Rhätische Bahn much of the track is located on benches cut in the vertical mountain sides.

On the Bernina Bahn a straight line will cut the track in nine places on the south side of the Alps and six of these levels may be seen from one point, the other three being higher up and on the other side of the mountain's nose. On this line the longest grade is 7 per cent for 20 miles. On light-traffic lines rack railways are used with grades up to 25 per cent, while the cable roads for tourists are on a grade of 55 per cent in places.

use semi-automatic tension in the overhead; that is, the messenger is anchored at the ends of sections and the trolley alone is attached to the weights.

A noteworthy feature on both the Lötschberg and St. Gotthard is that the power-house generators are wound for 15,000 volts and feed directly into the trolley line, as well as through substations.

The locomotive equipments in use have nearly all been supplied by the Oerlikon and Brown-Boveri Companies, and the mechanical parts by the Swiss Locomotive & Machine Works. The locomotives are of various types of wheel arrangement, and all but one have some form of rod drive. Although the single-phase locomotives are all operated with low-frequency power, they are quite free from vibration and quiet in operation. This is largely due to the excellence of their mechanical construction and maintenance. Rod bushings, pins and bearings are made accurate initially and are set up with very small tolerances. Further, they are maintained in good condition. The maintenance cost is reasonable, if one may judge from the small number of men in the shops.

It is interesting to note that resistors for dynamic braking are located on the locomotive roof and give satisfaction in spite of the severe climatic conditions.

Switzerland has embarked on a definite program of electrifying all main lines on account of the scarcity of fuel and abundance of water power. The next step now under way is the line between Zurich, Lucerne and Erstfeld. Swiss engineers seem well satisfied with the gear-and-side-rod type of drive for freight and moderate-speed passenger service. For higher speed passenger service on the lines with easy grades two types of locomotives with independently driven axles are now under construction and both types will have quill drive.

ITALY IS STRONG ON THREE-PHASE

We entered Italy by way of the Bernina Bahn on Sunday, encountering a recent innovation in railway rates. In common with those of other countries, the Italian Railways have had difficulty in securing enough revenue to meet expenses. The deficit is now being decreased by charging 20 per cent excess fare for Sunday travel.

The most extensive electrification in Italy is that of the State Railways at 3,000 to 3,700 volts, 15 to 16½ cycles, three-phase, using double trolley with induction motors. At present the roadbed and cars are in poor condition, both maintenance and operation suffering from the difficult labor situation, but the locomotives are well maintained.

This system has in operation and on order a total of 222 locomotives. Although various forms of wheel arrangement are used, all engines have rod drive. Line voltage is applied direct without transformers to the primaries of the driving motors. For speed variation, pole-changing or cascade connections, or both combined, are used. These locomotives are notable as having greater power per unit of weight than any other electric locomotives built to date.

Some locomotives are equipped with liquid rheostats, while others have metal resistors. In general, the acceleration is smooth and the locomotives are free from vibration. Of course, these locomotives brake by regeneration automatically on down grades. As severe grades are numerous in the electrified zones, this feature is a valuable asset.

The double overhead construction is a handicap to this system. Originally direct suspension was used for the trolleys, but later installations employ catenary suspension. With the direct suspension construction, it has been found necessary to replace the contact wires in tunnels every three years and on open line at the end of nine years. Maximum wear occurred at the hard spots formed by the suspension clips. Although the double overhead construction is expensive and complicated, its operation and that of the pantograph collectors are successful at 3,300 volts. It is proposed to continue the electrification of the State Railways in the north of Italy with this system on account of the many heavy grades. For southern Italy, where service conditions are much easier and where 42 cycles is the prevailing frequency, plans are under way for experimental lines with both high voltage, direct current and 42-cycle, three-phase power.

The results obtained on these experimental lines will serve as a guide in selecting the system for the south of Italy.

Since the first of this year the Torino-Cirie-Valle de Lanzo Railway has been operating three 55-ton (2,000 lb.) 560-hp. truck-type, box-cab locomotives with axle-mounted geared motors and manually operated control

from a 4,000-volt, direct-current trolley fed by a 1,300-kw. substation located at Cirie.

The driving motors are grouped two in series and the groups arranged for series-parallel operation and rheostatic braking. In addition to providing two engine-men's compartments and housing the control and auxiliary equipment (excepting compressor), the box cab also has space for a small baggage compartment. The motors have natural ventilation and the resistor is cooled by a fan driven by the motor-generator which supplies low-voltage current for the compressor and lights.

The service given comprises sixteen passenger and eight freight trains daily. The total train weight is 121 short tons. Initial operation has been very satisfactory. Minor defects which appeared in the motors have been corrected and some of the switching apparatus has been modified. Twenty-five short circuits on the trolley line have failed to flash the power generators, even when occurring in front of the substation.

LARGE PLANS FOR ELECTRIFICATION IN FRANCE

In France the Paris-Orleans Railway has a number of 600-volt, direct-current electric locomotives of the double-truck type with axle-hung motors, operating out of Paris. Some of these locomotives have box cabs with baggage compartments, and others have the steeple type of cab, seven of the latter having been in service for twenty years. The performance of these locomotives has been very good. They are inspected once a week, and at the end of 20,000 miles are out of service three days for overhauling. The life of motor windings is ten years, which is an evidence of the good results to be secured in general from electrical apparatus by imposing upon it only such duty as is within its capacity.

This railroad has recently placed in service the first of an order of five 1,800-hp. locomotives of the 2-8-2 type, equipped with two gearless motors and the open "V" type of rod drive. Up to the time it was examined this engine had made 12,000 miles in service with good results. Field control motors are used and a novel feature of this equipment is that the short field connection is controlled by a separate handle on the master controller.

The Midi Railway is in the process of changing its electrified zones from single-phase to 1,500 volts direct current in order to conform to the adopted standard system for France. For use in this connection sixteen 1,200-kw., 1,500-volt mercury rectifiers have been ordered. These will be located in the existing transformer station buildings and will be operated in parallel with other substations containing synchronous converters.

The State Railways (formerly the Western Railway of France) employ some of the heaviest suburban equipment in Europe. One type of motor car, weighing 63 tons, has two-axle trucks and a double equipment of 225-hp. motors. Another type, weighing 72 tons, has a quadruple equipment of 165-hp. motors, two of the motors being mounted on each three-axle truck. This road also has ten 800-hp. gearless locomotives with an early form of quill drive.

As in England, there is a tendency to the use of the three-car unit (one motor car and two trailers) for suburban service. It is planned rapidly to extend the multiple-unit electric service around Paris, and a definite program of main line electrification also has been started.

3,000-Volt Electrification on Paulista

Initial Installation on One of Brazil's Crack Railroads Now Practically Complete—Details of Locomotives, Substation and Power Distribution System Are Given by Engineers of American Manufacturers Who Supplied Equipment—This Pioneer Undertaking Is Forerunner of an Extensive Application of Electric Motive Power in Brazil



STATION AND YARD AT CAMPINAS, THE NORTHERN END OF THE PRESENT ELECTRIFICATION

THE most notable electrification project on this continent during the past two years is that of an important section of the Paulista Railway in Brazil. Within a few weeks the new equipment will be in operation. While brief notes regarding the Paulista have appeared in the *ELECTRIC RAILWAY JOURNAL* from time to time, it is only now possible to present a comprehensive statement of the electrification. To

this end the editors requested two engineers, of the General Electric Company and the Westinghouse Electric & Manufacturing Company respectively, men who are familiar with the details, to discuss the subject with respect to the work done by these two companies. The following two articles are the result. The General Electric Company is supplying eight freight and four passenger locomotives, the substation

equipment and the line material and is doing all of the erection work. The Westinghouse company is furnishing two passenger and two freight locomotives. All of this, together with much general information regarding the railroad itself, is covered exhaustively in the articles. As Mr. Cooper's article includes an account of the conditions under which the Paulista Railway operates it is placed first.—EDITORS.

The Paulista Railway and the Westinghouse Locomotives

BY S. B. COOPER

General Engineering Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

THE Companhia Paulista de Estradas de Ferro is about to begin electric operation over a 28-mile section of double track on its main line between Jundiahy and Campinas, Brazil. This marks the initial step in what is expected to become a broad program of electrification in Brazil, with the ultimate aim of substituting hydro-electric power for expensive coal.

Brazil's supply of native coal is not abundant; it is located in southern Brazil at some distance from the principal consuming centers and is of comparatively poor quality. It is high in sulphur and ash and, although some experiments have been made along the lines of preliminary treatment and pulverization, railroad men there are convinced that it cannot be considered a satisfactory fuel.

Some years ago, when the South American countries

were essentially producers with a comparatively small consuming capacity, ships bound from the United States and Europe to South America for cargoes of cereals, meats, coffee, hides, etc., were able to carry coal at comparatively low rates on outbound voyages. Coal could be landed in Rio de Janeiro or Buenos Aires for \$6 or \$7 per ton. Since that time, however, the development of these countries has been phenomenal—their consuming capacity has increased with the development of their resources and industries, so that high-class outbound cargoes are available. The worldwide shortage of ships caused by the war has raised ocean freight rates enormously and these two factors, combined with the increased coal prices at the mines, have caused the price of coal to reach almost prohibitive figures.

WOOD BURNED EXTENSIVELY ON LOCOMOTIVES

During the war it was almost impossible to obtain coal at all, except in very limited quantities at exorbitant prices, so that many of the Brazilian railroads, the Paulista among them, fell back on wood as

locomotive fuel. Brazil has, of course, a wonderful supply of hard woods that make excellent fuel, but even Brazil could not keep up with the demand for wood fuel for her railroads, at least from sources within commercially practicable distances of the lines. Furthermore, for a given calorific value wood fuel requires a comparatively large amount of labor in cutting, transportation, storing, handling, fire patrolling in supply yards, etc. With the rapid development of her marvelous resources, Brazil, and particularly the State of São Paulo needs labor badly. I heard the statement made in 1917 that there were 15,000 men in the State of São Paulo engaged in getting out wood for the railways.

The topographical and climatic conditions are such as to give abundant water

power. A sharp mountain range, the Serra do Mar, rises practically at the seacoast, reaching a height of 2,000 to 2,500 ft. or more within a very short distance from the ocean. From this range the drainage is, in general, toward the northwest, with a gradual fall into the Paraná River, which thence flows south, emptying into the Atlantic Ocean through the Rio Plata at Buenos Aires. The State of São Paulo is semi-mountainous, with abundant rainfall, and is crossed by several fairly large rivers with frequent falls and without excessively low water periods.

What then could be more logical than the utilization of this abundant native power instead of inferior or expensive coal? The officials of the Paulista company have made careful studies, during the last four years, of the possibilities of electrification, and in the spring of 1920 placed their orders for the equipment necessary for the electrical operation of the 28 miles of double track between Jundiahy and Campinas.

PRESENT ELECTRIFICATION IS BUT THE BEGINNING

Jundiahy is the southern terminus of the Paulista system, where it joins and exchanges traffic with the São Paulo Railway, the English owned line running to Santos. Campinas, one of the most important centers of this wonderfully rich state, is the terminus of the Mogyana Railways, an extensive meter-gage system, covering the northern portion of the state. The Mogyana traffic is transferred to Paulista broad-gage (1.6 meters, or about 5 ft. 3 in.) cars at Campinas, for movement over the Paulista and São Paulo Railway lines to Santos, so that the section now being electrified is the one of heaviest traffic on the Paulista system. It is planned to extend the electrification in the near future beyond Campinas, and it is probable that eventually the entire broad-gage main line will be electrically operated.

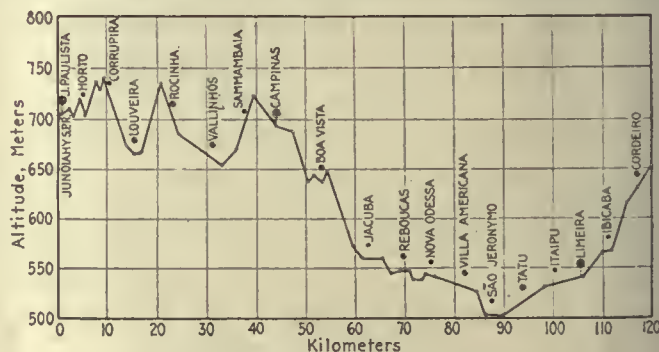


ELECTRIFIED SECTION OF THE PAULISTA AND CONNECTIONS

The Westinghouse Electric International Company is furnishing two freight and two passenger locomotives for this initial electrification. The freight locomotives are of the six-axle type, with two six-wheel articulated trucks. There are six axle-mounted motors rating 280 hp. at the one-hour rating. Each motor is wound for 1,500 volts for operation two in series on 3,000 volts and is arranged for field control. Each motor drives its axle by a single flexible gear. The passenger locomotives are of the 2-4-0+0-4-2 type, with each driving axle equipped with a 560-hp., 3,000-volt twin motor and quill drive.

These details were chosen because they lend themselves particularly well to the requirements of this road. The passenger and freight train weights and schedule speeds are such as to require locomotive horsepower ratings almost exactly in the ratio of four to three, so that by using eight armatures on the passenger locomotive and six on the freight locomotive it was possible to use identical motors in both services, except for the external frames. The passenger motors are in twin frames, while the freight motors are in axle and nose-suspension frames, but the motors are identical electrically, and all replacement parts, coils, complete armatures, field poles, brushes, armature bearings, etc., are interchangeable throughout. This operating advantage is obtained without the sacrifice of fitness of type of each engine for its service. The freight locomotives, operating at speeds up to 40 m.p.h. with comparatively light axle loads, have the mechanical simplicity inherent in axle-mounted motors and direct-gear drive, while the passenger locomotives for speeds up to 65 m.p.h. have the advantages of high center of gravity and large proportion of spring-borne weight given by the quill drive, so desirable in high-speed service.

Mechanical practice on the Paulista, as on many South American railroads, follows European rather than American lines, and their standards of mechanical workmanship and maintenance are higher than those followed on North American roads. Every effort was made in the design of these locomotives to meet these high standards of mechanical practice. The frames are of solid slab steel with the openings drilled and burned out by torch. The brake rigging and equalizer parts are fitted with case-hardened pins and bushings throughout, thus minimizing wear and facilitating replacement. The



PROFILE OF TRACK ON THE PAULISTA RAILWAY NORTH FROM JUNDIAHY

pedestal shoes are of bronze and the journal boxes are arranged for grease lubrication of the hub liners.

The control equipment has been worked out to give the greatest possible degree of simplicity consistent with operating flexibility, including the Westinghouse system of unit switches. All switches required to break heavy currents are of the unit type mounted in two

rows just below the main grid resistors. Motor combination circuits for motoring and regenerating are set up by cam switch groups and stabilizing resistor connections for regeneration are made by smaller unit switches without blowout coils.

The Paulista uses the Continental type of coupler with take-up screws on the passenger cars, but only open links on the freight equipment. For this reason it is particularly desirable to have a high degree of flexibility and smoothness in the control. This is accomplished by having three motor combinations of six, three and two armatures in series on the freight locomotives, giving, with field control notches, six running speeds. The main handle on the master controller has eighteen positions, giving a total of fifty-four notches. On the passenger locomotives the armatures are con-

TABLE I—GENERAL DATA OF WESTINGHOUSE LOCOMOTIVES

Type of truck.....	Freight	Passenger
	0-6-0+0-6-0 Articulated	2-4-0+0-4-2 Articulated
Rigid wheelbase.....	14 ft. 0 in.	8 ft. 4 in.
Total wheelbase.....	37 ft. 0 in.	41 ft. 2 in.
Length over buffers.....	50 ft. 2 in.	52 ft. 11 in.
Total height over cab roof.....	12 ft. 7 in.	12 ft. 7 in.
Total height with pantograph down.....	14 ft. 10 in.	14 ft. 10 in.
Diameter of driving wheels.....	40 in.	63 in.
Total weight, short tons (2,000 lb.).....	116.6	140.8
Weight on drivers, tons.....	116.6	101.8
Motors.....	6—No. 350	4—No. 351
Gear ratio.....	16:63	28:86
One-hour rating, per motor.....	280 hp.	560 hp.

motive brakes as desired, thus making it possible to shut down the exhauster during light engine or switching movements.

The traffic on the Paulista system is growing at a very healthy rate and even with double track it will not be many years before track capacity becomes a serious



A SAMPLE OF THE WELL-CONSTRUCTED TRACK THAT IS BEING ELECTRIFIED ON THE PAULISTA

nected eight, four and two in series, giving six running speeds and fifty-four notches.

Regeneration is provided for in all three combinations, with thirteen notches in each combination, giving a particularly wide range of regenerating speeds, a most desirable feature with the various classes of trains and varying grade conditions existing on the Paulista.

In the auxiliary equipment a single high-voltage auxiliary motor-generator set furnishes power for control, lights, motor excitation during regeneration, for blowers, compressor and vacuum exhauster. The motors driving the exhauster and blowers are practically identical. The control and auxiliary equipment throughout is the same on the freight and passenger locomotives, excepting for such detailed differences as are required for the control of six and eight armatures respectively. The brake equipment consists of a combination of air and vacuum brakes. The space requirements for the cylinders made it impossible to use vacuum brakes on the locomotives, so they are equipped with air brakes. The control of the brakes is so arranged that air on the locomotive and vacuum brakes on the train are handled from a single valve with uniform rates of application and release. An independent straight air valve is provided for the separate control of the loco-

consideration. It seems probable that by that time both the São Paulo and Paulista Railways will change over to M. C. B.-type couplers, enabling them to handle much larger trains. With this end in view, these locomotives have been equipped for multiple operation so that they can be double-headed with a single crew and handle 1,540-ton (2,000-lb.) instead of 770-ton trains. The bumper castings have been so designed that M. C. B. couplers can be readily applied.

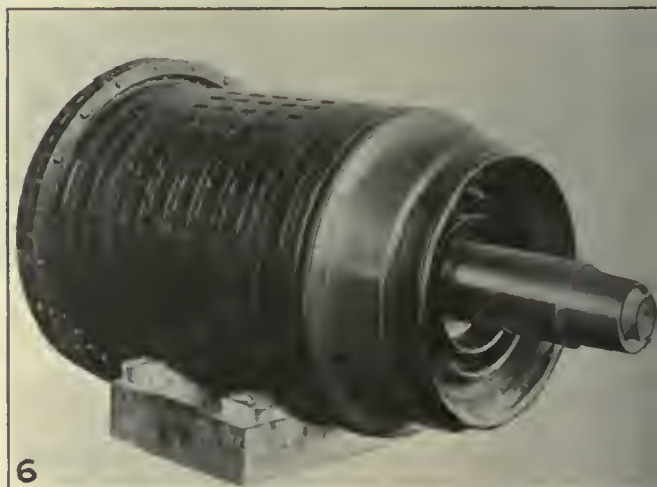
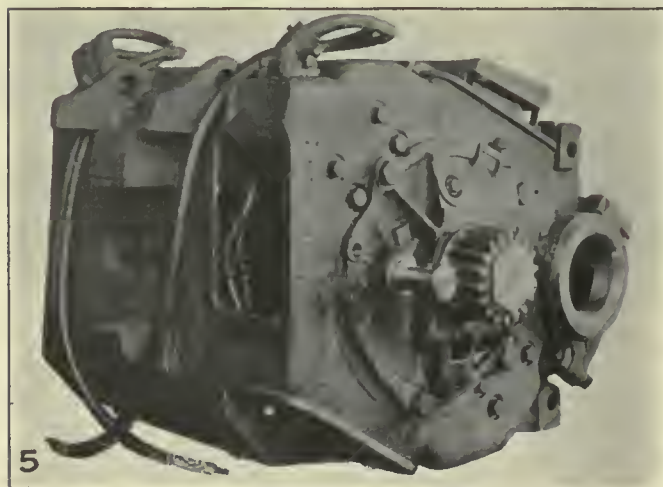
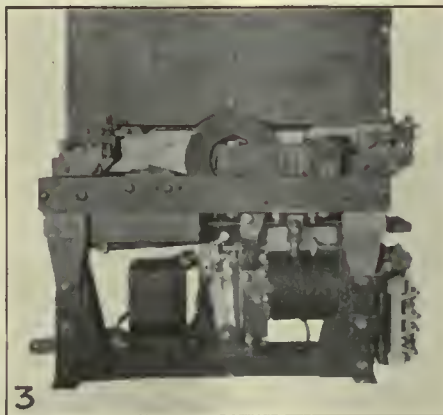
The more important ratings and dimensions of the two types of locomotive are shown in Tables I and II. Ratings are on the basis of the A. I. E. E. rules throughout, the continuous rating being based on 80-deg. C. rise by thermometer, or 105-deg. rise by resistance, thus giving conservative total temperatures with the high air temperatures encountered at certain seasons in Brazil.

TABLE II—WESTINGHOUSE LOCOMOTIVE RATINGS—SHORT FIELD

One-hour rating, horsepower.....	1,680	2,240
Tractive effort, pounds.....	29,400	19,400
Speed, miles per hour.....	21.4	43.2
Continuous rating, * horsepower.....	1,350	1,800
Tractive effort, pounds.....	21,600	14,300
Speed, miles per hour.....	23.4	47.2
Tractive effort at 25 per cent adhesion, pounds.....	58,500	51,000
Maximum safe speed, miles per hour.....	40	65

* A.I.E.E. Standardization Rules, 80-deg. C. rise by thermometer; 105-deg. C. rise by resistance.

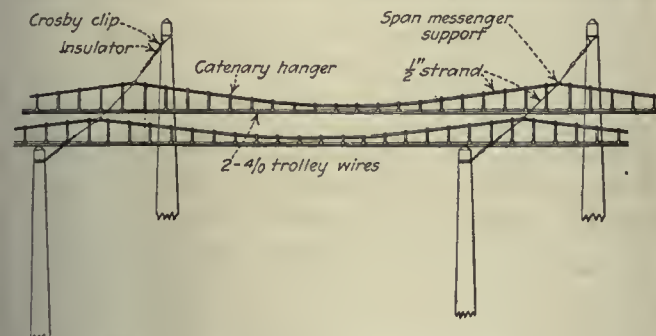
Paulista Electric Locomotives and Important Parts of Their Electrical Equipment



1—The Baldwin-Westinghouse freight locomotive.
2—End view of same locomotive, showing Continental coupler.
3—High-speed circuit-breaker used on the General Electric locomotives.

4—The General Electric freight locomotive.
5—Commutator end of G.E. motor, Type 267, Form A.
6—Armature for GE-267A motor.
7—The 120-ton General Electric passenger locomotive.

The shipment of these locomotives involves some interesting features. Each cab is completely housed in after being mounted on a heavily framed platform. The housing consists of a double lumber sheathing interlaid with heavy waterproof building paper. Each truck complete with its motors and gears mounted in



DIAGRAMMATIC SKETCH OF DOUBLE-TRACK, CROSS-SPAN CATENARY ON TANGENT

place is similarly boxed and two additional boxes per locomotive carry the pantograph trolleys. The truck and pantograph boxes are loaded in the ship's hold and the two cabs are carried on deck, one on either side of the main hatch, securely bolted and lashed in place. After unloading and unboxing, it will only be necessary to set the cab on the trucks, mount the pantographs and connect up the motor leads and brake connections and the locomotive will be ready for service. By the time this article is printed the freight locomotives will probably have been landed in Brazil. The passenger locomotives are now approaching completion in the East Pittsburgh works of the company.

The General Electric's Contribution to the Paulista Electrification

BY W. D. BEARCE

Railway and Traction Engineering Department, General Electric Company, Schenectady, N. Y.

THE concluding shipments are being made on the \$2,000,000 contract with the International General Electric Company in connection with the electrification of the Jundiahy-Campinas section of the Paulista Railway.

The motive power equipment being furnished by this company consists of eight freight locomotives weighing 100 tons (2,000 lb.) each and four passenger locomotives weighing 120 tons each. Work has been progressing on these locomotives for about a year at the Erie works and the first locomotive was put on the test track about the middle of March. Complete running tests were made and two freight locomotives were shipped before the middle of May. One of the passenger locomotives was also put on the test track and shipment was made, according to schedule, during May.

In addition to the locomotives, the contract included the equipment of a complete 3,000-volt, direct-current substation of 4,500-kw. capacity, comprising three 1,500-kw., three-unit motor-generator sets, transformers, switchboards and high-tension equipment. Overhead line material has also been furnished for 76 miles of track and material for about 10 miles of 88,000-volt, three-phase, 60-cycle high-tension transmission in duplicate from the lines of the São Paulo Light & Power Company.

The line from Campinas to Jundiahy is a main line section connecting at the southern terminus with the

São Paulo Railway and the Central Railway of Brazil. The Central Railway is government owned and electrification of this line has also been authorized. At Campinas and other points north connection is made by the Paulista Railway with a number of feeder lines, which bring large quantities of coffee and other raw material from the interior.

The road is rock ballasted and the construction throughout is equal to any of the main-line roads in the United States. The track gage is 5 ft. 3 in. on the section to be electrified, but some of the connecting lines are narrow-gage and facilities are provided for transferring the car bodies complete with merchandise to narrow-gage trucks and vice versa. The passenger service includes high-speed passenger trains with full Pullman accommodations. The present locomotive equipment consists of heavy-type locomotives for freight service with high-speed engines for passenger service. All are equipped for burning wood. The variety of wood most used is known as quebracho, which gives satisfactory results except that, of course, the quantity required for a 100-mile run is very bulky. Recently there has been difficulty in procuring even wood that is suitable for this work.

ENORMOUS TONNAGE HANDLED ON SECTION BEING ELECTRIFIED

The section selected for electrification presents a rather difficult profile, including maximum grades of 1.5 to 1.8 per cent. While the immediate plans of the Paulista company contemplate electrification for only a distance of 73 miles, the design and capacity of all apparatus and equipment are suitable for operating on an extension to São Carlos, a total distance of 128 miles. The approximate traffic handled over this line during the year 1918 from Jundiahy to Cordeiro was about 275,000,000 ton-miles, including freight, passenger and non-revenue service. The electrical equipment is designed for handling approximately double this amount, as is also the substation and line equipment. As a basis for estimates it was assumed that the number of trains per day over the initial electric zone will be six passenger and twenty-one freight in each direction, making a total of fifty-four trains per day.

LOCOMOTIVE DESIGN FOLLOWS UNITED STATES MODELS

The initial order for locomotives included eight freight and four passenger, all of the twin-g geared type. These are similar to those in successful use in the United States on the Chicago, Milwaukee & St. Paul, the Butte, Anaconda & Pacific, the Michigan Central (Detroit River tunnel) and other roads.

The freight locomotives weigh 100 short tons, all weight being on the driving axles. They are designed



TRUCK OF THE GENERAL ELECTRIC 100-TON FREIGHT LOCOMOTIVE

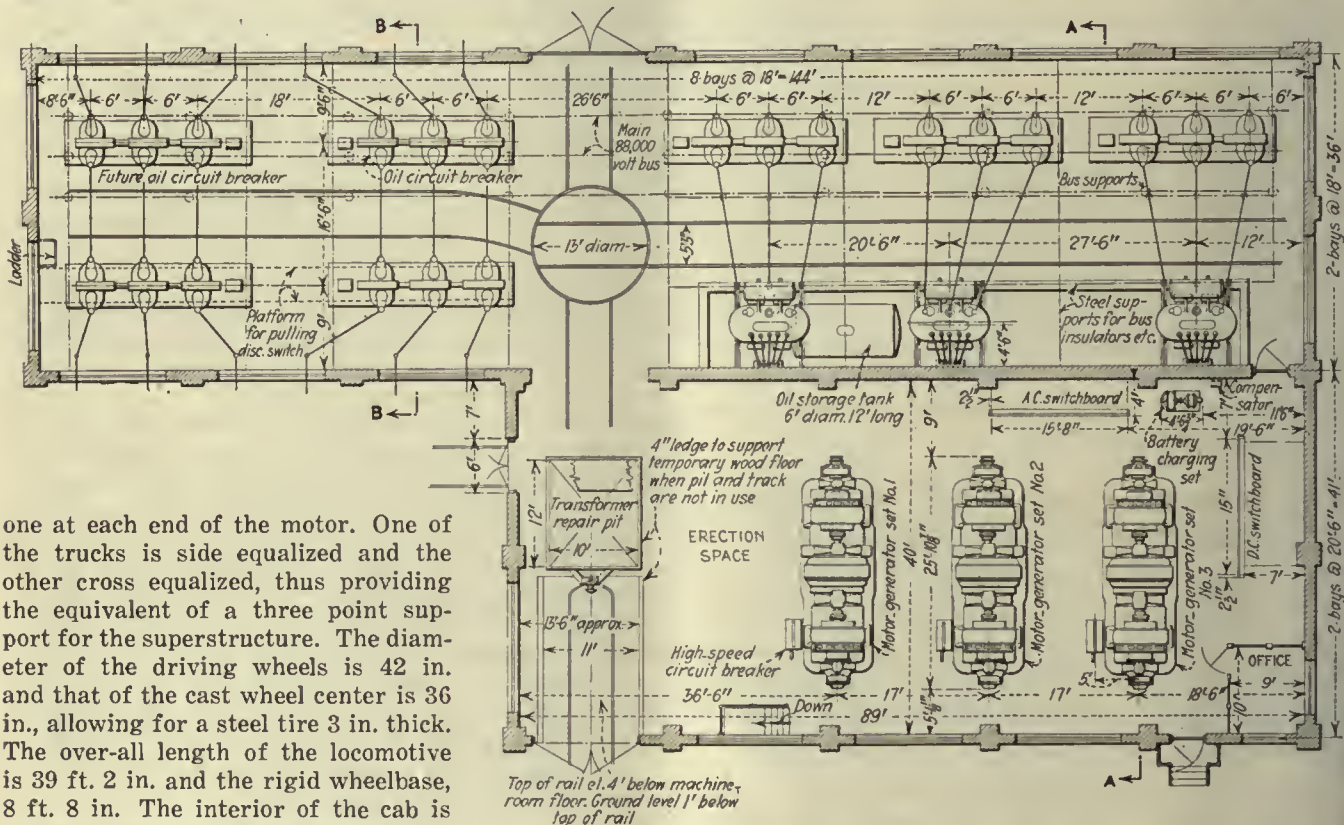
for handling a trailing train of 770 short tons on the maximum 1.8 per cent grade at speeds of from 12 to 16 m.p.h. The maximum allowable speed on tangent level track is 30 to 35 m.p.h. It is expected that because of the greater capacity and higher speed characteristics the electric locomotives will provide an appreciable improvement over the existing steam service, both as regards schedule speed and weight of trains handled.

The freight locomotive has a running gear consisting of two two-axle trucks coupled together by an articulated joint, and a single cab of the box type. The draft gear is mounted on the trucks, and all hauling and buffing stresses are transmitted through the truck frames and articulated joint, thus eliminating any possibility of damage to the cab and platform structure. Each truck is equipped with two GE-267 motors of the box-frame type, geared to the driving axle by two sets of gearing,

on the locomotive alone or on the train alone if desired. During regeneration, however, a magnet valve insures that straight air cannot be applied while power is being returned to the trolley. However, should an emergency application be made, regeneration is discontinued and the brakes are applied on the locomotive.

WIDE GAGE PERMITTED USE OF MOTORS OF SELF-VENTILATING TYPE

The motors are of the box-frame commutating-pole type designed for self-ventilation, made possible by the ample room due to the wide gage. To supply clean air for ventilation of the motors, a ventilating pipe is provided, reaching to the outside of the locomotive truck. The fan is of the multiple type made integral with the armature-head flange on the end opposite the commutator. Air is taken into the frame at the com-



one at each end of the motor. One of the trucks is side equalized and the other cross equalized, thus providing the equivalent of a three point support for the superstructure. The diameter of the driving wheels is 42 in. and that of the cast wheel center is 36 in., allowing for a steel tire 3 in. thick. The over-all length of the locomotive is 39 ft. 2 in. and the rigid wheelbase, 8 ft. 8 in. The interior of the cab is divided into three compartments by partitions or bulkheads so placed as to form two end compartments about 5 ft. in length for the operator's cabs and the remainder for housing the control equipment, compressor-exhauster set and other auxiliary apparatus. Two pantograph trolleys, of the double-pan sliding type similar to that used in other heavy electrification projects, are mounted on the cab roof. These are insulated for 3,000 volts and were designed to operate through a range of from 15 to 22 ft. above the rail.

TWO TYPES OF BRAKE NECESSARY

To conform to the equipment on this road it was necessary to provide control for the vacuum type brakes used on the cars. Two entirely different systems of brakes are therefore provided for—a straight air brake system for the locomotive and vacuum-type brakes on the train. The two systems are manipulated like the usual all-compressed-air type, the locomotive brakes being applied automatically simultaneously with the train brakes under normal running. Brakes can be applied

mutator end through a screened opening and divides into two streams, one passing over and around the armature and field coils, while the other is drawn through longitudinal ducts in the armature core. All of the air is expelled from the frame at the end opposite the commutator. These motors are designed for operation at 1,500 volts per commutator with two motors connected permanently in series for the 3,000-volt supply. The gears are of the forged steel type with a reduction of 82 to 18 or 4.56.

NON-AUTOMATIC SINGLE-UNIT CONTROL INSTALLED

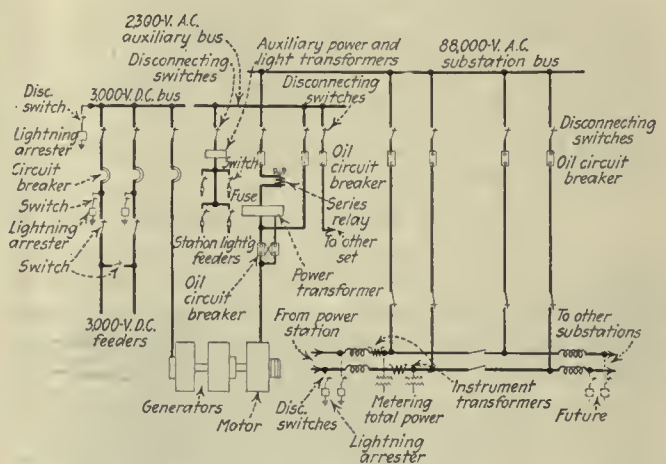
The control equipment is the type M, designed for non-automatic single-unit operation of the locomotives. All contactors, rheostats, transfer switches and the reverser are located in the central compartment of the cab. The master controllers, brake control, sander control, pantograph and other control devices are in the operator's cabs at the ends of the locomotive.

Energy for operation of the control is obtained from a 65-volt generator which is a part of the compressor exhaustor unit. A 65-volt storage battery is connected in parallel with the generator to maintain constant voltage and to supply auxiliary lighting when the set is not running.

The motors may be operated all four in series through fourteen steps of resistance, and with two motors in series and two groups in parallel through ten steps of resistance. Regenerative braking is provided for returning energy to the line on descending grades. Ten steps are used for the regenerative braking control. The lighting and miscellaneous equipment includes the necessary lamps, switches, fuses and wiring for illuminating the cab and for headlights and accessories. The headlights are of the incandescent type with side number plates and are supplied from the 65-volt generator or battery. Speed recorders are included as a part of the locomotive equipment. The draft gear is attached to the end frames of the truck and is of the usual European type. The compressor-exhaustor set is a combined unit having a compressor with a total piston displacement of 48 cu.ft. of air per minute at a pressure of 90 lb. per sq.in., an exhaustor with a displacement of 150 cu.ft. of air per minute and a 65-volt direct-current generator above mentioned. The unit is driven by a 3,000-volt, direct-current motor, operating from the trolley.

PASSENGER LOCOMOTIVES HAVE GUIDING TRUCK AT EACH END

The passenger locomotives are similar in design to the freight units except that a two-axle guiding truck is provided at each end to comply with the railway company's specifications for high-speed service. The motors used are identical with those on the freight locomotive except for the change in gear ratio to provide for maximum speeds of from 56 to 62 m.p.h. The running gear consists of two two-axle driving trucks, the inner ends of which are connected by an articulated joint. The outer ends are extended and supported on the guiding trucks by roller centering devices over the front axle and an articulated joint over the rear axle which also connects the guiding and motor trucks. The general arrangement of motors and control is the same as that on the freight locomotives, and a similar system of regener-



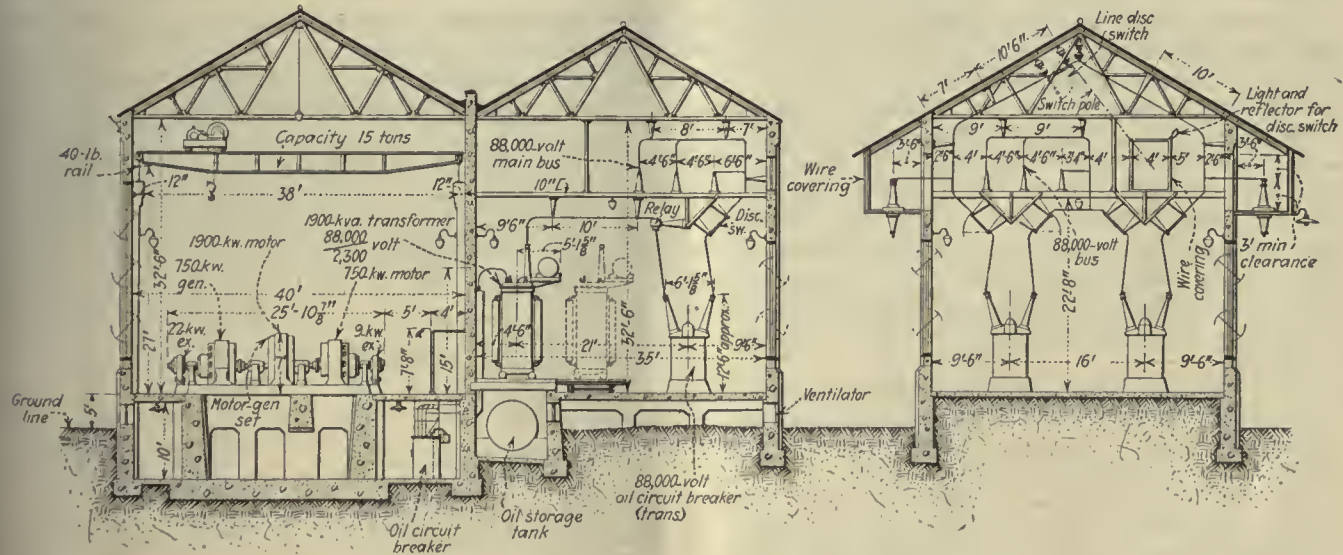
SIMPLIFIED WIRING DIAGRAM, LOUVEIRA SUBSTATION

ative braking is also provided. This locomotive is designed for hauling a train of 440 tons trailing up a 1 per cent grade at a speed of 38.8 m.p.h. The gear ratio on the passenger locomotive is 70:30 or 2.33.

For speeds above the full series and full parallel connections a shunted field connection is provided by means of which the field current is reduced for maximum speed running.

Regenerative braking is accomplished by connecting one motor in such a way that it excites the field of three other motors and also its own field. This scheme is in general similar to that used on the Chicago, Milwaukee & St. Paul gearless passenger locomotives; it eliminates the necessity for a separate motor-generator set for excitation. A balancing resistance is connected in the circuit to protect the motors against sudden surges of the line voltage and to give effective protection against line voltage changes. In order to begin regeneration the main controller handle is turned to the first notch series position and the selective handle to the braking position. The main handle is then notched up until the desired braking effect is obtained.

A high-speed circuit breaker is placed between the 3,000-volt trolley and the locomotive apparatus. The duty of this breaker is to protect the motors and equipment from injury due to short circuits or overloads. In case of a short circuit this breaker cuts in a protective resistance and then opens the line contactor. The



VERTICAL SECTIONS OF SUBSTATION (SEE A-A AND B-B IN PLAN)

action is very rapid so that in case of heavy overload, or short circuit, the possibility of damage is reduced to a minimum. Breakers of a similar type are in operation in many parts of the United States both on locomotives and in substations.

Table III gives the dimensions, capacity and weights of the two locomotives.

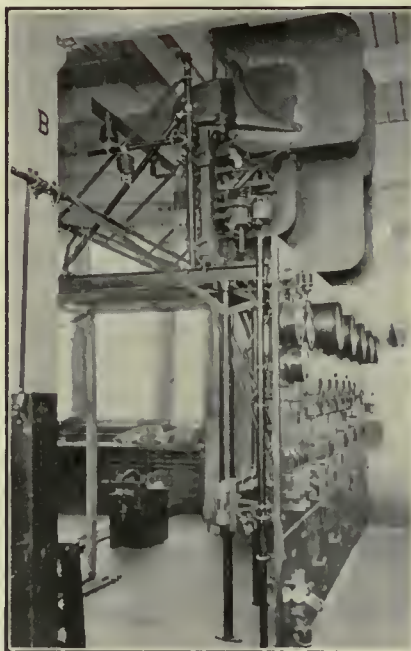
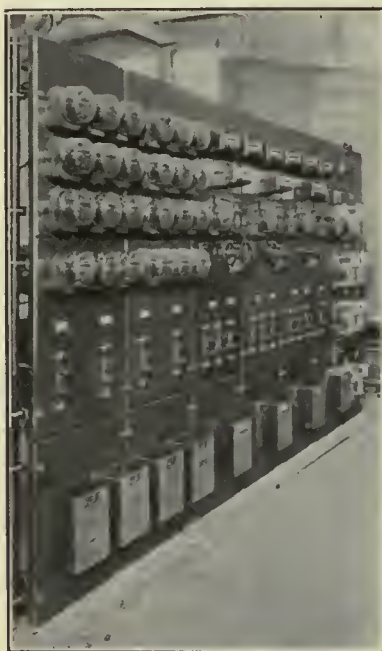
SUBSTATION INSTALLED AT LOUVEIRA

For the initial electric zone between Jundiahy and Campinas one substation is being installed located at Louveira, a distance of 9.5 miles from Jundiahy. This station contains three 1,500-kw., three-unit synchronous motor-generator sets, each arranged to operate its two generators in series for 3,000 volts. Power is received from an 88,000-volt, 60-cycle transmission line and stepped down through three three-phase, 1,900-kva. transformers to 2,300 volts for the synchronous motor.

The three-phase oil-insulated and oil-cooled transformers are rated at 1,900 kw. and are inclosed in tanks

The motor-generator sets are substantially similar to those furnished for heavy electric railroad work in the United States. The generators are designed for 1,500 volts per commutator and are permanently connected in series for 3,000-volt operation. They are separately excited from a 125-volt, direct-current exciter mounted at one end of the set. The series field is designed to provide flat compounding from no load to 150 per cent load. They are equipped with commutating poles and compensated pole-face windings to insure sparkless commutation at all loads. A load of three times normal rating can be carried for five minutes without injury, and under tests made before shipment loads of from five to six times normal were carried without sparking.

All of the fields of both generators are connected to the "low" side to reduce the possibility of injury from high voltage. A simple form of flash barrier is provided for the commutators similar to that supplied on other high-voltage, direct-current machines.



SWITCHBOARD VIEWS, LOUVEIRA SUBSTATION
At left, 90-in. feeder and synchronous motor switchboard. In center, 3,000-generator and railway feeder switchboard. At right, back of the generator and feeder board shown from another angle in the center illustration.

of steel plate with all joints welded. Four separable steel radiators are mounted on the outside of the tank to provide sufficient radiating surface.

Each transformer is provided with an oil conservator or auxiliary tank mounted on the cover. This device permits the main tank to be completely filled with oil and differences in volume of oil due to temperature changes take place entirely within the conservator. This prevents the condensation of moisture within the transformer. Such condensation as may occur in the conservator is collected in a sump, is indicated on a gage glass and may readily be drawn off through a pet-cock.

Since there is no air in the main tank above the oil there is no possibility of explosion due to ignition of gases formed from hot oil. The guaranteed efficiency of these units at normal load is 98.3 per cent.

Four $2\frac{1}{2}$ per cent taps are provided in the low-voltage winding to compensate for variation in the transmission line voltage and 50 per cent starting taps are also provided for starting the motor-generator sets.

The synchronous motor is excited from a second 125-volt exciter direct-connected to the opposite end of the set. This exciter carries a compound winding excited from the main 3,000-volt conductor so that the motor

TABLE III—DATA ON GENERAL ELECTRIC LOCOMOTIVES FOR PAULISTA RAILWAY

	Freight	Passenger
Length over all.....	39 ft. 2 in.	55 ft.
Width.....	10 ft. 1½ in.	10 ft. 1½ in.
Height over trolley down.....	14 ft. 3 in.	14 ft. 3 in.
Total wheelbase.....	26 ft. 8 in.	46 ft. 0 in.
Rigid wheelbase.....	8 ft. 8 in.	7 ft. 9 in.
Total weight, pounds.....	200,000	240,000
Weight on drivers, pounds.....	200,000	160,000
Weight per driving axle, pounds.....	50,000	40,000
Weight per guiding axle, pounds.....	None	20,000
Weight of mechanical equipment, pounds.....	115,400	155,400
Weight of electrical equipment, pounds.....	84,600	84,600
Diameter of drivers.....	42 in.	42 in.
Diameter of guiding wheel.....	42 in.	36 in.
Number of motors.....	4	4
Gear ratio.....	82:18	70:30
Total continuous rating, horsepower.....	1,600	1,600
Total (one-hour rating) horsepower.....	1,680	1,680
Traction effort, continuous, pounds.....	28,820	14,720
Traction effort, one hour, pounds.....	30,600	15,680
Speed, continuous rating, miles per hour.....	21 (34 km.)	41.25 (66.4 km.)
Speed, one-hour rating, miles per hour.....	20.8 (33.5 km.)	40.5 (65 km.)
Maximum safe speed, miles per hour.....	28	53
Traction effort, 30 per cent adhesion, pounds.....	60,000	48,000

field excitation varies in proportion to the load on the set. This provides for the proper excitation to give correct power factor with varying loads and also insures stable operation under heavy overloads. The equipment is designed for inverted operation to take care of reverse power in cases of regeneration.

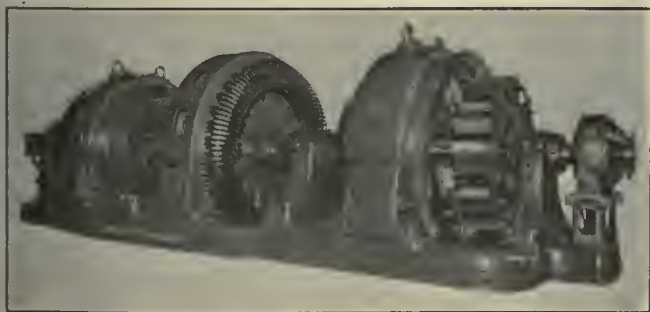
The switchboard is similar in design to other 3,000-volt, direct-current equipment. The 3,000-volt panels are installed together with the auxiliary station lighting panel. The high-voltage panels include one for each of the motor-generator sets and one for each outgoing feeder. The main circuit breakers are located above and to the rear of the switchboard panels so as to be well out of reach to prevent accidental contact. They are remote-controlled from operating levers located on the front of the panels. A 3,000-volt line switch is also included with each circuit breaker. These switches are remote-controlled from the front of the panel, as a safety measure. The switch handles for the circuit breakers are inverted to distinguish them from the line switches. The alternating-current switchboard is electrically controlled throughout. For lightning protection, a 96,000-volt aluminum-cell arrester is installed in the high-tension room of the station.

As a protection from short circuits and excessive overloads a high-speed circuit breaker is furnished with each motor-generator set. This is connected to the negative terminal of the machine and arranged to connect a limiting resistance into the circuit upon opening. At the same time the station circuit breakers are opened, completely cutting off the power supply. The speed of these circuit breakers is such that resistance is inserted in the circuit before the short circuit current reaches sufficient value to injure the apparatus.

Other auxiliary equipment supplied to the station includes a 15-ton hand-operated crane, a portable oil filter press and oil testing equipment, and a stationary compressor set. For control current a $4\frac{1}{2}$ -kw. battery-charging motor-generator set is used with a 170-volt storage battery.

HIGH-TENSION CONNECTION WITH POWER COMPANY'S LINE

The railway company's high-tension transmission line has been constructed with duplicate circuits mounted on separate wood poles between Jundiáhy and Louveira, a total distance of 10 miles. At Jundiáhy this line is



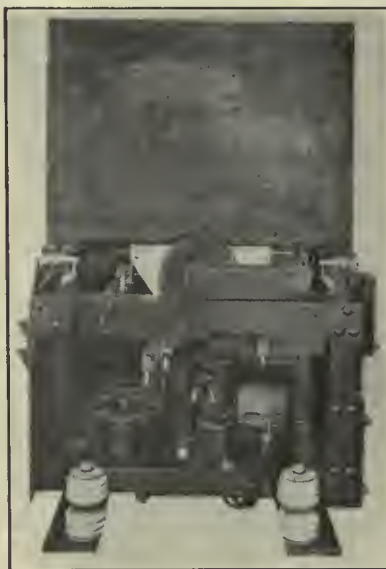
THREE-UNIT, FOUR-BEARING, 1,500-KW. M. G. SET
IN LOUVEIRA SUBSTATION

permanently tied in with a new line constructed by the São Paulo Light & Power Company, extending a distance of about 16.8 miles to the hydro-electric station at Parnahyba. The power company's line is constructed with an H-type pole line carrying the duplicate circuits. This transmission line from the waterpower plant to

the substation will thus be operated over a distance of 26.7 miles as a single system at 88,000 volts, three-phase, 60 cycles. The line is designed ultimately to supply three substations and the conductors are of No. 0 B. & S. stranded copper which will insure a very low line loss under ordinary operating conditions. On the railway company's lines two crossarms are used, with large pin-type insulators. A ground wire is also carried on each transmission line for lightning protection.

The overhead line construction is of the same general design as that used on the Chicago, Milwaukee & St.

Paul. This is known as the twin-catenary construction, with two No. 0000 contact wires supported from the same steel messenger by loop hangers. Wood poles suitably guyed support the catenary. Hangers for the two contact wires are attached at alternate points to give a flexible construction and to insure the elimination of all "hard spots." Bracket supports are used on single-track and cross spans on multiple-track construction. The normal height of the con-



HIGH-SPEED SUBSTATION
CIRCUIT BREAKER

tact wire is 21 ft. above the rail. For all sidings and yard tracks a single wire is used over each track. The General Electric Company furnished hangers, pull-offs, copper and steel wire, miscellaneous hardware, etc., for 76 miles of track.

The twin-catenary construction is particularly successful on lines operating heavy trains requiring the collection of large amounts of current through pantograph trolleys. In addition to the advantage of the two contact wires for handling the current required, this construction also insures practically sparkless collection at the point of contact, both for heavy freight and high speed passenger operation.

The rails on this line weigh 91 lb. per yard. They are bonded with pin-terminal-type bonds, 42 in. in length and of 211,600 circ.mil cross section. Cross bonds are also used for interconnecting the rails of the same track and for bonding between tracks on the multiple-track section.

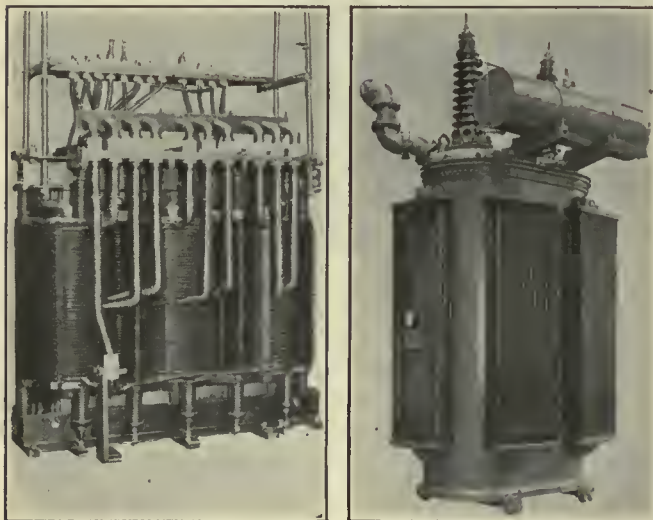
TESTING AND SHIPPING THE LOCOMOTIVES

In the preparation of the locomotives for testing and for export shipment there were a number of unusual features. As the gage of track on the Paulista Railway is 5 ft. 3 in., special arrangements were necessary to provide for removing the locomotives from the shop to the test track and other arrangements were necessary to provide the necessary test track. For this purpose about 1 mile of extra rail was laid on the East Erie Commercial Railroad with 5 ft. 3 in. gage. In order to transport the locomotives from the shops to the test track, a distance of about $\frac{1}{4}$ mile, special transfer trucks were used, one for each truck of the loco-

tive. By means of these trucks, which operate on their own wheels of standard gage, the locomotives were moved out over the usual transfer table and standard-gage track to the special-gage section provided for testing. Upon reaching this section they were moved off the transfer trucks over a ramp, the end of which was elevated to the same height as the special trucks.

A complete set of tests is made on all locomotives, including regenerative braking and high-speed running. After test the locomotives are transferred to the shipping department, where they are dismantled and prepared for export shipment. The cab complete is removed from the truck and the pantograph, bells, etc., removed from the cab roof. Each truck is shipped separately without removing the motors from the truck frame. In the case of the passenger locomotive, each bogie truck is shipped with the adjacent motor truck without dismantling. As large vessels were available for making this shipment it was not necessary to reduce the locomotive to small packages.

As to progress on the construction of these locomotives, the first freight machine was ready for test on



AT LEFT, THREE-PHASE TRANSFORMER FOR LOUVEIRA SUBSTATION, HIGH-TENSION SIDE

At right, case for a single-phase transformer, showing type to be used at Louveira. (Exterior view of actual case not available at this time.)

March 15. During May three freight and one passenger locomotives were shipped and progress on the balance of the order indicated that similar shipments will be made the following two months in accordance with the terms of the contract.

Responsibility for Accident Fixed

THE Interstate Commerce Commission in fixing the responsibility for head-on collision between a passenger train and an extra freight train of the Northern Ohio Traction & Light Company near Ravenna, Ohio, on Dec. 8, 1920, resulting in the death of four people and injury to seventeen, finds the conductor and motor-man of the extra train to blame. The conductor of the extra train, which was being operated ahead of the regular train, proceeded from a siding at the sound of a whistle from the regular train intended as a signal to move ahead so there would be room for it to clear the switch. The extra train proceeded on this signal, the conductor assuming that the following train had orders to meet the opposing train at the next station.

Recommends Electrification Commission

Frank J. Sprague Points Out the Advantages of Such a Body at the Meeting of the Chicago Traffic Club on June 2—He Includes Representation of the Interstate Commerce Commission in Its Personnel

ACCORDING to Frank J. Sprague the time is ripe for the formation of a national engineering commission to consider electrification problems, the commission to be selected by the American Railway Association and to include representatives of the Interstate Commerce Commission, the National Electric Light Association and the water power, telephone and telegraph interests, in full touch with manufacturing developments. This suggestion was made by Mr. Sprague in the course of an address by him before the Traffic Club of Chicago on June 2, in which he considered also the development of the electric railway.

In Mr. Sprague's opinion the demand for electrification will come not because of superior fuel economy or savings in operating expenses possessed by the electric locomotive but because of the need for increasing the capacity of the railway by "that increase of speed which can only be obtained when unlimited power is at the command of operative officials and a type of equipment is used which will permit radical changes in methods of train handling, both on the road and at terminals." Mr. Sprague recognizes that electrification must come progressively, but he believes that the financial problems concerned with main-line electrification would be ameliorated if the railroads recognized that their primary province is the transportation and distribution of passengers and freight and that their power requirements should be supplied from central generating stations.

He then points out that the railway power demands in the city of Chicago, for instance, could be met by the Commonwealth Company by the addition of only a fraction of its present capacity and that this could be added in less time than the railroads could possibly be electrically equipped. He also expressed the belief that electrification in Chicago should be determined not according to the needs of a single railroad, but by that of all the railroads centering in the district, in co-operation with the local authorities, keeping in view the ultimate best interests of the railroads and of the community.

In answer to any criticism of his suggestion that the proposed national engineering association should include in its membership representatives of the Interstate Commerce Commission, Mr. Sprague called attention to the fact that the equipment and operation of trunk-line railways, in fact of all railways crossing state bounds, is a matter of national concern and under the jurisdiction of the Interstate Commerce Commission. Moreover, it alone today has the right to demand intimate comparative statistics and data covering the equipment and operation of railroads by different systems and its power and authority are likely to be augmented rather than restricted. Finally, in the consideration of another railway problem, that of automatic or auxiliary train control, the power to order the installation of such a system was placed in the hands of the commission in the recently enacted general railway bill.

N.E.L.A. Meeting Well Attended

At Its Annual Convention, Held at Chicago May 31 to June 3, National Electric Light Association Considered Railroad Electrification, Power Generation and Distribution, and Other Technical Subjects, but Laid Special Stress on Public Relations, Finance and Operation in Their Broad Aspects

THE convention of the National Electric Light Association, held in Chicago last week, occupied itself largely with finance and public relations. Executives, engineers, bankers and heads of the manufacturing and jobbing concerns were in attendance. The questions of regulation were discussed from all angles by managers of utilities and by public service commissioners. Public relations, to the betterment of which the association has devoted so much time and publicity during the past few months, received earnest consideration. From without the industry, manufacturers, bankers, publicists and government officials contributed their impressions of how utilities may best win public recognition and support, while from within the testimony of executives and others showed that the electric public utilities of the country are doing their part through excellent service at fair rates and through various channels of public information to carry the message of the utilities to the man in the street.

Samuel Insull, speaking on future expansion in the use of central-station power, touched on some of the vital issues of the day and gave wholesome advice on superpower systems. It is fair to say that no session of the very many held during the week was without its important feature. In fact, the program was so crammed with excellent reports, papers and addresses that their immediate absorption and appreciation was out of the question during the sessions of the convention.

A masterful analysis of the fundamental economics affecting electric light and power company service, in which the attention of the industry was focused on the points of primary interest, was made by Martin J. Insull in his presidential address. Mr. Insull stated that the industry is in a strong position but in need of tremendous sums of money to take care of the program of expansion demanded by the public. Money, he believed, must be obtained from the public, which fact necessitates careful attention to good public relations. Finally, he saw the cessation of municipal regulation and operation in favor of state regulation. The small-town plant is going; the big system feeding the small towns from a transmission line is taking its place.

In general, said Mr. Insull, the electric light and power business continues its growth. It is estimated that there is necessary and will be installed 1,000,000 kw. of generating capacity during this calendar year. The industry may, therefore, look forward to a promising future. It is estimated that for the next five years the electric light and power industry, in order to provide for the demands that will be made upon it by the public, will require approximately \$1,000,000,000 per year.

At the second general and executive session, in reporting for the Superpower Survey, M. S. Sloan said that the government had appropriated \$100,000 for the study and that a number of utilities and manufacturing companies had contributed \$50,000 more to complete the work. The chief difficulties were legal and financial

rather than engineering. It was the purpose, he said, to seek a federal charter because of limitations imposed by state laws and the charters of the large public utilities involved. The committee was unanimous in its opinion that the superpower system should be controlled by the existing public utilities and financed by private capital.

R. H. Ballard of Los Angeles, in reporting for the public policy sub-committee on inductive interference, told of the meetings held between executives of the National Electric Light Association and the American Telephone & Telegraph Company for the purpose of correlating their activities and jointly working out solutions to inductive-interference problems. While the engineers will continue their work, it was agreed that no precedents would be invoked in establishing the rights of either the telephone or electric light companies, but that both interests would seek the best economic solution of the problem.

The report of the underground systems committee was of special importance because of manufacturers in the country now being able to construct cables capable of withstanding voltages up to 33,000. Discussing higher voltages for underground cables, Mr. Roper said that the Commonwealth Edison Company is planning to distribute 33,000 volts over cables which during the last two years have been installed for 22,000 volts. No trouble is expected with the higher voltage. The report of the committee on prime movers was a complete one. It will be abstracted in a later issue of this paper. That of the committee on railroad electrification is abstracted below.

Electrification of Steam Railroads

THE committee on steam railroad electrification presented a general study of the subject with a view to showing the members of the association how and why the railroads will furnish an increasing market for electric power. The committee comprised L. A. Ferguson, vice-president Commonwealth Edison Company, Chicago, Ill., chairman; A. H. Armstrong, General Electric Company; W. C. L. Eglin, Philadelphia Electric Company, and F. H. Shepard, Westinghouse Electric & Manufacturing Company. The following abstracts from the report will indicate its general form and spirit:

The steam locomotive has been developed to a point where it meets the conditions imposed upon it by the transportation problems of freight and passenger services, satisfactorily in most cases and in all cases where the traffic is light. As the traffic has increased on roads on which there are heavy grades, additional capacity has had to be provided by laying additional tracks. It is not the intention of the committee at this time to advocate the abandonment of either the freight or the passenger steam locomotive in places where it can be used to economical advantage.

The steam locomotive suffers from the disadvantage

that the steam generator must be carried with it, and it must be capable of withstanding shocks and vibrations, thus limiting the design of the fire-box to a metal fire-box of relatively small size and materially reducing the efficient burning of the coal. The standby losses of the locomotive must be high and these losses increase in the larger units, as the coal must be consumed whether the engine is running or not, as long as the locomotive is in service.

REAL ESTATE CONSIDERATIONS IN ELECTRIFICATION

The economical advantages of moving freight in bulk, requiring the use of heavy trains, are causing increase in the size of the yards and the terminal facilities so as properly to assemble these trains. With the growing value of real estate in the large communities, the cost of these terminals now forms an important part of the total railroad investment, and with the development of the city with buildings surrounding the existing yards it is becoming very difficult to enlarge these facilities to meet the growing requirements. Thus means must be provided to increase the capacity of yards and terminals. It seems logical and rational that both the railroad tracks and especially the yards and terminals must be operated at a number of levels to increase their capacity in the existing areas. This must be accomplished by the elimination of the steam boiler from the locomotive.

For two essential reasons—the ability must be had to increase the locomotive capacity to any desired limit for haulage purposes on the existing main tracks and it must be possible to permit the tracks to be placed on various levels—some method of delivering power to the locomotive other than in the form of coal in the present locomotive tender must be employed.

WHERE THE ELECTRIC LOCOMOTIVE FITS IN

The application of electricity to the railroads will naturally follow the line of its application to the industries. It will permit a better accomplishment of the functions of the railroad by increasing the speed of trains and reduction in the investment cost of terminals or the increase in their capacity. Its application must come where the greatest advantages of its use will be shown. Probably the most notable examples will be in the operation of trains through long tunnels, where the ventilation problem makes it more mandatory; in meeting the increasing requirements of terminal and yard facilities; in maintaining the highest speeds on the roads with heavy grades, and in its use on sections in which increased speed of general or special movements is necessary to handle existing or growing passenger or freight traffic.

The committee believes that the extension of the use of electricity for motive power must come through its economic advantages and its ability to assist the railroad organization in meeting the growing requirements of traffic and reducing the cost of operation and maintenance.

VARIETY IN TYPE OF MOTIVE POWER WILL CONTINUE

There are now available methods and apparatus such that electrical energy may be supplied to the train to meet the requirements of speed, load and grade. The selection of the type of apparatus will vary with the requirements of the railroads, and it is probable that there will be as many different sizes, types and designs

of electric locomotives as there are at present of steam locomotives.

The power companies of the United States should be ready to furnish electrical energy to take the place of the coal which is now delivered to the railroads at the mines, enabling the railroads to obtain promptly and in any quantity the required electrical energy produced by the large generating stations of the power companies, and that at a rate which would compare favorably with the cost of its production in power houses built for the railroad load alone.

New Tube Cars

Hudson & Manhattan Railroad Lengthens Doors on Latest Twenty-five Cars and Makes a Few Changes in Interior Equipment of Car

THE Hudson & Manhattan Railroad has recently purchased twenty-five additional steel cars to accommodate the traffic of the road. The construction of these cars follows very closely that of the cars previously used by the company, but they have wider side doors and are 3 ft. longer over all than the older cars. The use of the wider center doors does not change the seating capacity, but adds greatly to the convenience of passengers in entering and leaving the cars. Another point of difference is that while the system of vertical posts and horizontal rods for passenger support in the car is retained the posts directly on each



THESE NEW HUDSON & MANHATTAN CARS EMBODY SEVERAL CHANGES FROM THE FORMER TYPE

side of the side doors have been omitted. This change is shown in the view of the car interior. The purpose of this change is to prevent passengers from blocking the side entrance by holding on to one of these posts.

The new cars are equipped with ceiling fans. Similar fans are also to be applied in the older cars to provide for a brisk circulation of air even when the cars are standing at stations. The fans do not show in the interior view of the car as they had not yet been installed when the picture was taken.

The cars are equipped with GE-259-A motors, G. E. P. C. control and Westinghouse A. M. L. E. air brake equipments, all adapted to function with the older equipment, which has been fully described in the *ELECTRIC RAILWAY JOURNAL*.

New York Municipal Car Improvements

Since the Introduction of the Large Multi-Side-Door Cars on the Lines of the New York Municipal Railway Various Additions and Refinements Have Been Made to Provide Increased Comfort and Safety for Passengers

WHEN the Brooklyn Rapid Transit System offered to operate a part of the vast subway and elevated network as suggested by the city of New York in 1911 the design of a car most desirable was one of the vast problems presented to the engineers of this company for solution. When the various details of design were finally settled the most noteworthy characteristics of this car in which it differed from other designs were its large size, its unique seating arrangement and its multi-side-door construction. The value of these new features embodied in the design has now been demonstrated by more than five years of service under the most severe traffic conditions that can be found in any city. At present 900 of these cars are in service or on order and in the fundamental considerations the last cars, namely, the 2,800 series, are identical with the first ordered. Quite a number of refinements and improvements have been added, but the changes which were made in construction were very few.

The essential characteristics of the design, construction and equipment of these cars were very completely covered in a series of articles published in the issues of the *ELECTRIC RAILWAY JOURNAL* for June 6, 1914; June 13, 1914; Dec. 26, 1914; March 13, 1915; March 27, 1915, and May 8, 1915. The purpose of the present article is to describe some of the improvements and changes incorporated in the last 100 cars ordered and include additions made since this series of articles was published.

MONITOR TYPE ROOF FOR VENTILATION

The form of roof used with the 2,800s is of a low monitor type with twenty deck-sash ventilators on each side of the car. This construction provides a clearstory 4 ft. 11 in. wide inside by 12½ in. deep. The deck-sash ventilators are arranged in four groups, so that those in a quarter of the car can be operated separately from a lever near the center of the car. The ventilators swing horizontally and have an opening of 25 in. by 4½ in. This type of roof construction lends itself particularly well to the ventilation system using five ceiling fans in each car.

The five ceiling fans are arranged with one opposite the center pair of doors and the others at about equal distances along the center of the headlining. The five

fans of each car are connected in series across the line, so that each fan is wound for 115 volts. The fan motor frame is designed for direct attachment to the car ceiling and a metal canopy incloses the top part of the motor.

With the use of the ceiling fans the arrangement of lights consists of fourteen side lights, seven on either side, installed just at the edge of the clearstory, and six center lights, two of which are end lights. There is thus a total of twenty 56-watt lamps with shades per car. The fundamental principle of the seating arrangement adopted for the New York Municipal cars was to obtain maximum seating capacity during hours of normal traffic and maximum standing room plus a reasonable proportion of seating capacity during the rush hours. In order to facilitate movement to and from the door openings the space opposite each active doorway

was kept free, except for vertical stanchions installed for the accommodation of standing passengers. Study of the conditions that existed with the cars loaded to their maximum capacity indicated that a few hand straps on either side of the door openings provide comfort for the standing passengers, and accordingly twenty-eight hand straps, fourteen on either side of the car, have been installed. These are grouped with two hand straps on either side of the end side doors and three hand straps on either side of the center pair of side doors. These are of the Henry type, all metal with white enameled hand grips, and arranged to be held back close to the side of the car by spring pressure when not in use.

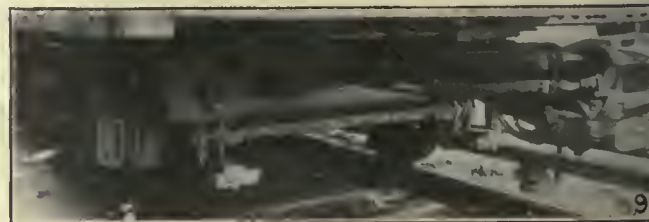
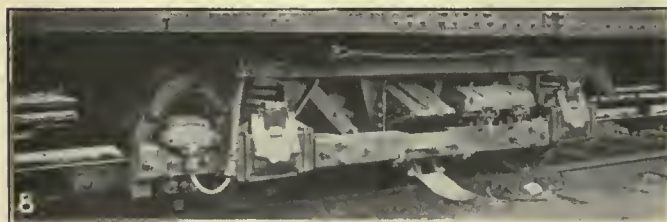
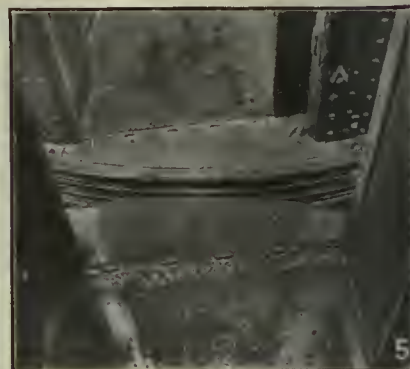
IMPROVEMENT IN FOLDING SEATS

In order to increase the seating capacity during hours of normal traffic, hinged folding seats are used on either side of the door openings. In their raised position these folding seats serve as ends for the longitudinal seats and a grab handle along the front edge enables standing passengers to get a firm hold. These folding seats are held in their raised position by a lock catch which can be released only by the aid of the key used for the end doors and the operator's push-button box. With the seats in their "down" position a prop swings out from the under side and rests on the floor. This seat prop is made of a pipe framework with two legs which have rubber cushions at the points where they



LOW MONITOR TYPE ROOF CONSTRUCTION WITH DECK-SASH VENTILATORS, VENTILATING FANS AND REARRANGED LIGHTING

Some Features Embodied in New York Municipal Railway Company's Cars



- 1—Interior of switchboard panel.
- 2—Push-button section of switchboard panel, pipe framework footrest interlocked with door engine, cut out, coasting recorder, destination sign and hand straps.
- 3—Wide type pantograph shoes.
- 4—Small panel box with push-button switch, recess provided for hand brake.
- 5—Types of end-door threshold plates.

- 6—Cross-seat recessed to provide knee room for passengers in seat behind.
- 7—Panelling at end of car, design of motorman's cab door and end door with drop sash.
- 8—Truck mechanism, cast steel contact shoes and shoe-fuse box cover.
- 9—Safety hangers for truck slack adjusters and shoe hangers cross connected.

rest on the floor. All parts are rounded so that no sharp corners or projections are presented, which might prove injurious to passengers or their clothing, and as this framework is mounted so that it extends out from the side of the seat it also serves as a grab handle for standing passengers, with ample space for their fingers to provide against accident. A center leg of this framework is attached to a lever which is connected to the door engine underneath the stationary seat at this point. The lowering of the folding seat cuts off the air from the door engine, so as to insure that the door behind the seat cannot be operated with the seat in its down position.

It is the practice of the New York Municipal Railway to operate trains with the end doors of the several cars closed, and the seating arrangement provides a small seat just to the left of each end door with hinges, so that it can be raised but cannot be removed.

Two cross seats are located just to the rear of the motorman's cab. This is the only position in the car where two cross seats come one behind the other. To provide additional leg room for passengers in the rear seat, the back part of the front seat has been constructed with a cut-out portion, which comes just below the back seat cushion. By this ingenious arrangement, an additional 3 in. of leg room is provided for passengers without change in the other parts of the seat construction.

NO DANGER OF INTERFERENCE WITH MOTORMAN

To provide maximum privacy for the motorman the door of the cab has been provided with a steel panel in the top portion and a small length of wire-ribbed glass in the center portion. The bottom of the door is also provided with a dust guard, as it is found that with the car in motion a current of air from the end door blows in through the motorman's cab, particularly when the window is raised. Thus dust and other particles are blown under the bottom of the door. The steel panel in the rear of the motorman's cab is utilized for an advertising sign rack.

Several window positions have steel panels. One of these is just to the left of the end door and others are provided just to the side of the end side doors. The use of steel panels reduces the maintenance cost for broken glass considerably and also provides increased revenue from their availability as advertising sign racks.

Drop sash have been provided in the end doors which are arranged for the dropping of the top part of the sash, the window being made in two parts. This gives increased ventilation and a circulation of air through the entire train.

In one of the accompanying illustrations showing exteriors of the cars the paneling of the small window to the left of the end-side doors can be seen. In these cars the car number has been placed on the side of the car over this window. It was found that this is preferable to numbered glass which when broken causes considerable delay in returning the car to service, as a new glass has to be numbered and the paint thoroughly dried before it can be installed. The routing and destination sign is located in the second window to the right of the center side doors. This location provides for use of signs with large letters which can be distinctly and easily read, and also gives more space for the sign proper, as the number of destinations and routes are increasing considerably due to the addition and operation of new lines.

In the illustration of the outside end of the car the pantograph safety gates are shown. A wide shoe now used insures proper contact even on sharp curves. Another view, taken between two cars, shows the threshold plates at the end doors. In the new design the outside ends have been cut off so that they extend but a few inches outside of the end doors.

ELECTRIC TRIP SWITCHES ADDED

In the views showing truck construction and equipment electric trip switches are shown at the left end of the truck. Two of these are installed per car on diagonally opposite corners. This truck mechanism for the trip switches consists of a lever which extends down toward the rail and engages the track trip. This lever is self-centering by heavy springs and acts through a gear and pinion to operate a contact device and open the circuit whenever it is operated. The opening of this circuit de-energizes the holding coil of an electro-pneumatic valve installed in the small cabinet over the push-button switches on the inside of the car.



DESTINATION SIGN WITH LARGE LETTERS, AND NUMBER ON SIDE OF CAR

This electro-pneumatic valve operates a dead man's valve which opens the brake pipe and causes an emergency application of the brakes. As soon as the track trip has been passed, the truck trip switch returns automatically to its central position, closing the circuit at that point. However, the circuit still remains open, due to the dropping of the electro-pneumatic valve. A reset circuit is used for restoring the valve to its normal position, with a reset switch in each motorman's cab. There is also a pneumatic switch in this circuit, which is connected directly to the brake pipe. This closes whenever the brake pipe pressure has been reduced to 5 lb. or less. The electro-pneumatic valve can then be reset without the motorman moving from his cab, but as the brake pipe pressure must be reduced to 5 lb. before this circuit is closed ample time is given to insure that the train comes to a stop before the normal condition can again be re-established.

The cast-steel contact shoe is also shown in the second illustration, and the shoe-fuse-box cover. The cover is of wood, reinforced with wide steel bands having spring mounting.

The journal boxes provide substantial support for the shoe beams and heavy brake-shoe release springs assure prompt release from the wheels. Following the general practice in this design of providing safety straps for all brake-rigging parts, additional safety straps have been added under the truck slack adjusters. A cross-connection has also been added between the brake-shoe hangers at the end of the truck. This gives

a rigid construction and prevents brake shoes from developing false flanges or wearing out of true.

All doors of a car are controlled from push-button boxes forming a part of switchboard panels located on either side of the car between the center pair of doors. The push buttons are arranged in three rows, those in the center row being for opening the doors. To energize any of the push buttons it is necessary for the operator to insert a key in the key switch at the upper left-hand corner of the box and to turn this to close the circuit to the button. As an extra safeguard on the opening buttons, a cast-bronze guard is installed over them. With this in place there is no danger of false operations with the cars in motion should the operator forget to remove his key from the key switch.

The lighting, heater and compressor switches are located at the top of the panel board. An ingenious method of preventing the operator from hanging on to the steel door of the panel board or other grounded metallic parts while he is throwing these switches involves the use of an insulated safety cover. This cover is hinged from a point just above the top of the switches, and in its normal position extends down so as to cover the switches and the fuses completely. In order to throw a switch it is necessary for the operator to raise this insulated panel, and the most natural method of doing this is to hold it in its raised position with the left hand while the switches are being thrown with the right hand. The operator must maintain his hold on this insulating panel, which insures his being insulated from ground without danger of receiving a shock should he inadvertently touch any live part. This insulated panel also forms a very conspicuous place for posting information regarding the various fuses and switches. All fuses and switches are given numbers on the panel board and the instructions tell what circuits they are used in, so that should trouble occur in service the operator does not need to test several circuits to find the trouble, but can locate it immediately by referring to the instructions.

CONVENIENT METHOD OF OPERATING LIGHT SWITCH

Another ingenious and trouble-saving device is the key-lighting switch, located at the right-hand center part of the panel. As these cars operate in the open as well as in tunnels, it is necessary to turn the lights on and off during each trip. With the usual type of lighting switch this would require the opening of the panel board door each time it was necessary to throw this switch. This requirement has been done away with by the use of a key switch in the lighting circuit which can be operated by the insertion and turning of a key without opening the panel board door. The keyhole for this switch is made with a large funnel-shaped guard, so that the operator can readily find the keyhole even should he neglect to turn the light on in the car until after it enters the tunnel.

This panel board also contains the switch for operating the ventilating fans. This is a safety switch located just underneath the safety lighting switch. All exposed parts of this switch are insulated, so that the operator cannot come in contact with any live parts.

The hand-brake handle folds back against the side of the car just underneath the small switchboard panel and is held in position by a safety catch. The steel side panel has been cut out just at the handle to provide additional space for the inserting of the hand for operating the hand brake.

The storage batteries of the car are charged from the line as well as through the compressor circuit. A battery-charging relay operates to connect the car batteries to line through a resistance whenever the pressure drops as low as 26 volts. With the batteries connected for charging directly from the line a 2-amp. charging current is received. The normal voltage for these batteries is thirty-four, and whenever this voltage is reached the battery-charging relay automatically cuts out. In normal operation the batteries are charged through the compressor circuit.

Electro-pneumatic line switches, Westinghouse type 267-E-9, are used on these cars. These are found desirable on account of the large number of times that the main operating circuit is opened and closed while going over gaps in the third rail.

Improvements in the electro-pneumatic brakes used provide for a quick application of the brakes throughout a train at all times whether they are applied pneumatically or with the electric features cut out. An indicating pilot lamp is connected so as to show whenever the brakes on a car are cut out. This pilot lamp is located inside the car just to the right of one set of the end side doors, and its conspicuous location insures that cars are not operated in service with brakes cut out unless it is essential due to trouble on that particular car. The motorman is then advised of the condition, so that safe operation is assured.

California Association Meets

THE sixth annual meeting of the California Electric Railway Association was held at the Palace Hotel, San Francisco, on May 11. At the close of the meeting W. R. Alberger, vice-president and general manager of the San Francisco-Oakland Terminal Railways, was re-elected president for a third term. W. V. Hill was re-elected manager, and the executive committee, composed of the following, also was re-elected: Paul Shoup, president Pacific Electric Railway; W. E. Dunn, vice-president Los Angeles Railway; William Clayton, vice-president San Diego Railway, and William von Phul, president Market Street Railroad.

W. V. Hill, the manager, is now in Washington, D. C., having accepted the office of Washington representative of the tax committee of the National Utilities Association.

Applying the Stethoscope to Machinery

A RECENT issue of *Engineering*, London, gives details of an ingenious scheme for permitting supervision of the condition of bearings and other vital parts of machinery. A specially constructed telephone microphone is screwed to each bearing or other possible source of trouble and supplied with current from a dry battery cell. All of these "trouble detectors" are wired to a central point where a simple switchboard permits plugging in of a telephone receiver on the circuits in succession. A milli-ammeter forms a part of the switchboard and is used to insure the continuity of the test circuit, so that silence in the telephone due to a broken circuit may not be taken as an indication of a perfect bearing. This device is an application and extension of the familiar stethoscope used by physicians in studying the action of the human heart. It virtually places the ear of the superintendent at every essential bearing in the plant.

Elimination of Waste

Report of Engineering Council's Committee Contains Concrete Suggestions Which Are Applicable to all Industries—High Labor Turnover One of the Commonest Wastes

THE report of the American Engineering Council's Committee on Elimination of Waste in Industry was presented on June 3 to the executive board of the Council in St. Louis. After discussion on the acceptance of the report, its publication was authorized not as a report of the Council but as the findings of the committee.

The report declares that between 4,000,000 and 5,000,000 workers were idle during January and February of this year, that billions of dollars are tied up in idle equipment and that high labor turnover is a rough index of one of the commonest wastes. Nationwide machinery to obtain continuous information concerning unemployment conditions throughout the country is called necessary, means for regularizing employment in the principal industries is urged and an elaborate plan of nationwide co-operation between the government, the public, trade associations, the industries, labor, bankers and engineers is outlined.

The waste inquiry was in charge of a committee of sixteen headed by J. Parke Channing of New York as chairman and considered particularly the industries of housing and building, ready-made men's clothing, shoes, metal trades and printing, but the results are said to be typical of all industries in all parts of the country.

The economic loss annually from preventable diseases and death according to the report is over \$3,000,000,000; 42,000,000 persons gainfully employed lose 350,000,000 days from illness and disease and non-industrial accidents annually; 42 per cent of the wastes of ill health is preventable. In 1919 there occurred in industry 3,000,000 accidents, resulting in an economic loss to the country of about \$853,000,000.

Trade associations, it is declared, should help and can do so, among other ways, by promoting programs for standardization of production of cost accounting methods, of material specifications and of equipment and by encouraging industrial research.

The duties of management include a reduction of the high labor turnover, establishment of improved relationship with employees, maintenance of inspection control, and detailed planning of work in advance.

Organized labor, the report says, should develop a policy for increasing output; the attitude of opposition or indifference to proper standards for production should be changed to a frank and aggressive insistence on such standards; there should be a scientific examination of the bases for wages; certain union rules should be modified in regard to machine operation, apprentices and craft distinctions which result in restriction of output, and individual workers should realize their responsibilities for waste resulting from ill health and disregard of safety measures.

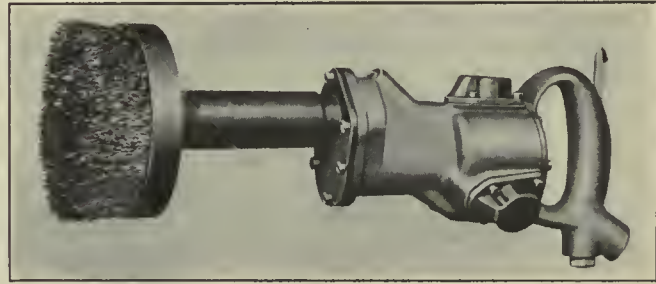
The banking interests, it was said, should especially encourage the stabilization of industry, and it is the duty of the engineers of the nation to support a wide and more thorough research into the following problems: Collective bargaining, hours of labor; methods of compensation; means of preserving and stimulating the creative instincts and the pride of craftsmanship of industrial workers; a standard labor and management terminology; common principles for the methods of

management, and the measurement of production standards.

The building industry was said to be about 60 per cent efficient. In the shoe industry the waste is put at about 35 per cent. The average plant in the metal trades group is from 25 per cent to 30 per cent behind the best plant in output per employee. In the ready-made clothing industry, the report says, it should be relatively easy to save three-quarters of a million dollars a day—an increase of 40 per cent in effectiveness.

Wire Brush Cleaner Attachment for Air Drill

WIRE brush cleaning of metal surfaces offers an opportunity for saving time and labor over that required by hand methods for removing paint, rust, scale, etc. Manufacturers have found difficulty in obtaining a wire brush of proper design and material which would work effectively and still not wear out too rapidly. A wire brush of very rugged design has re-



AIR-OPERATED BRUSH CLEANER ATTACHMENT

cently been placed on the market by the Ingersoll-Rand Company, New York, which is intended for use with its standard No. 6 "Little David" drill. The face diameter of this brush is 5 in. and the wires are made of special heat-treated steel, which has been found to possess good wearing qualities.

The No. 6 drill which is used with this brush has bearings designed particularly to take up the end thrust when pressing down on the work and the motor has a particularly high speed, which is also desirable. The whole outfit weighs but 11½ lb.

A New Structural Material

A NEW structural material called "Plymetl" has been produced by the Haskelite Manufacturing Corporation, Chicago. It is a composite of wood and sheet steel. It is manufactured by cementing thin sheet-metal faces to a relatively thick core of lightweight material. The two sheet-metal faces form smooth, impervious and durable surfaces. The non-metal core places the faces relatively far apart, giving the material great strength for its weight. Plymetl is furnished from stock in panels ⅝ in., ½ in. and ⅜ in. thick, with faces of black or galvanized sheet metal, No. 30 gage, and with planed fir wood veneer cores. These panels are made 30 in. by 96 in. and weigh 1.6 to 1.8 lb. per square foot. It is also manufactured to order in 24, 26, 28, 30 and 36-in. widths and in lengths of 96 and 120 in., and in thicknesses from ⅝ in. to ¾ in. The material can be cut with light machine shears and such cutting gives a desirable bevel to the edges.

A panel of this material, ⅝ in. thick and made up of No. 30 gage sheet steel and fir wood core and weighing 1.8 lb. per sq.ft., is claimed to have eighty times

the stiffness of a sheet steel of the same weight, namely, No. 19 gage. Its elastic limit in bending is claimed to be about five times that of the No. 19 gage sheet steel. The shearing strength of the cement that binds the metal to the core is even greater than the shearing strength of the wood.

Some of the advantages claimed for this new product are that it is strong and of light weight, that the even surface afforded by the metal does away with the cheap appearance of sheet metal, that the wood core takes away the metallic sound of sheet metal, and that the material will stand great abuse. Its use is suggested for car roof, interior panels, bins and shelves.

Repairing Decayed Poles

THE George C. Eggers Company, distributor of the Harding process for the reinforced concreting of pole butts, has given some results of the use of poles with concreted butts used by the Kootenai Power Company at Cœur d'Alene, Idaho. These have now been in service about six years.

In applying this method the ground is excavated around the butt. All decayed wood is removed and the butt of the pole is brush-treated to a height of 2 ft. above the ground line. A template is then adjusted around the butt of the pole at the proper height and twelve nails for supporting the reinforcing iron and the sheet metal form are driven to the proper depth. The template is then removed, the rings are put in place and the vertical tension rods are hung on. The lower form is then wrapped around the six lower nail heads and is backed up with earth as it is being filled with concrete. The lower form is next withdrawn and the upper form is adjusted at the proper height around the upper and lower nail heads, and a rubber form for casting the sealing groove is wrapped around the pole and tacked in place. The upper form is then filled with concrete and the top is sloped and smoothed off by means of a trowel. After twenty-four hours the forms are removed. When the concrete has become thoroughly dry the groove around the pole as well as the checks in the pole itself are well filled with a special sealing compound which is applied hot. The use of this process makes it unnecessary to replace old poles due to ground-line rot, as the concrete reinforcement can be applied to give a substantial construction and add much life to that of the pole.



DECAYED POLE
WITH CONCRETE
BASE APPLIED

Seal Replaces Lettering

A CONSIDERABLE saving in paint and painters' time is expected to result from a recent decision to do away with all lettering on the San Francisco Municipal Railway cars and to substitute a simple seal. Inasmuch as the municipal cars are painted a distinctive gray color, the seal will serve all purposes as well as the more elaborate lettering, it is believed. The seal bears the words Municipal Railway in letters $1\frac{1}{4}$ in. high encircling the letters S. F. All letters are of gold leaf with $\frac{1}{8}$ -in. black borders. The diameter of the outermost circle is 15 in.



SEAL

Letter to the Editor

Stick to Safety-Car Design Standards

BROOKLYN RAPID TRANSIT COMPANY

BROOKLYN, N. Y., June 6, 1921.

To the Editors:

I have read with much interest the article by J. C. Thirlwall of the General Electric Company appearing in the issue of the ELECTRIC RAILWAY JOURNAL for April 16, 1921, and again the article of May 7 by W. H. Heulings, Jr., vice-president and general sales manager of the J. G. Brill Company, both emphasizing the fact that there is no real reason for changing the design of the standard Birney safety car. I write to indorse their views.

It is one of the unfortunate phases of the electric railway industry, excusable in part on account of its newness, that some men in responsible charge of executive and operating departments believe that they are not measuring up to the expectations of the owners of the property and their local public unless they stamp their own individuality upon the property. They alter railway equipment that has proved generally successful elsewhere, forgetting that the real field for effort lies in the direction of initiative in design rather than in such changes. We are far from having reached standards in any respect, and in the field of car equipment it is improbable that one or even two or three types of cars will ever be generally adopted for general use. While the advantages to the purchaser of standardization are obvious, individuality in design on the part of the car builder, often involving patents upon parts, and the attitude of the purchaser in desiring to adhere to designs which are locally popular or which fit in with some well-founded policy, make such a course impracticable if not impossible.

It is particularly unfortunate, therefore, that certain properties should be engaged in efforts to make changes of doubtful value in the Birney safety car, the one prominent example of standardization falling within the scope of car design. It is the only example of consequence that illustrates what might be termed *standardization of design or direction of design*. Great credit is due the man who first conceived the idea of this car and those interests that first applied it. But credit is also due the manufacturers who have co-operated with the users in developing a standard car with standard electrical and mechanical equipment that has done much to keep down the initial price of the complete unit and to make possible prompt delivery of repair parts at reasonable cost. All of the manufacturing interests concerned are represented by a manufacturers' committee, of which the writer and one other railroad employee are members. In this every consideration is given to the further improvement of any part or feature of the car and its equipment and with especial reference to keeping down car weight. The sentiment is against increasing the weight without a real and compensating advantage.

Probably many one-man double-truck cars will be operated in the near future, cars fully equipped with the safety devices now used on the Birney car. I believe that there will be a very general adoption of such cars

either through the modification of existing cars or the acquisition of new units more suitably equipped for economical operation. But this is entirely separate from the suggestions that have emanated from a few quarters to the effect that "something different" be furnished, thereby entailing additional first costs and future operating costs.

What is needed are broader conceptions of the principles involved, closer co-operation with the manufacturers in the development of standard railway equipment of whatever character, and less effort to change unnecessarily what some one else has designed in the effort to obtain the highest efficiency and the greatest economy in the management of properties that now need such a service as never before.

W. G. GOVE,
Superintendent of Equipment.

Association News

Committee of One Hundred to Give Dinner

ANNOUNCEMENT has been made this week of a dinner party to be held on July 8 at the Commodore Hotel, New York, to celebrate the second anniversary of the creation of the Association's Committee of One Hundred. The dinner will be at 7 o'clock and the tickets are priced \$7.50.

Each member company is invited, under the plan of holding the dinner, to send one accredited delegate. In addition the members of the Committee of One Hundred are also extended an invitation to attend.

The speakers' program calls for a review by President Gadsden of the activities accomplished during the existence of the Committee of One Hundred and an outline of what can properly be done in the future. In addition there are to be other speakers of prominence who are to talk on subjects that pertain to national situations other than the electric railway problem.

Recent Presidential Appointments

PRESIDENT GADSDEN of the American Electric Railway Association, chairman of the joint tax committee of the National Utilities Association, has appointed W. V. Hill, manager of the California Electric Railway Association, as representative of this committee. Mr. Hill's office is located at 950 Munsey Building, Washington, D. C., and all matters relating to federal taxation can be taken up directly with him there.

President Gadsden has appointed several new members on the American Association committee on company sections and individual membership, the personnel of which is now as follows: Martin Schreiber, Public Service Railway, Camden, N. J., chairman; P. S. Arkwright, Atlanta, Ga.; J. P. Barnes, Louisville, Ky.; F. G. Buffe, Kansas City, Mo.; J. H. Mallon, Chicago, Ill.; H. H. Norris, New York, N. Y.; Charles C. Peirce, Boston, Mass.; E. F. Wickwire, Mansfield, Ohio.

Chicago Men Well Entertained

THE monthly meeting of the Chicago Elevated Railroad company section was held on May 17, with an attendance of about 150, with President J. H. Mallon in the chair. F. W. Shappert, who accompanied Secretary Denby on his recent inspection of the Atlantic fleet,

reviewed this event with the aid of stereopticon slides. H. A. Johnson, organization engineer Chicago Elevated Railroads, talked of his recent trip through the West as the representative of the Elevated Railroads on Mayor Thompson's Chicago transportation committee.

Stock Offering to Employees at Section Meeting

THE regular monthly meeting of company section No. 13 was held on May 19, at Camden, N. J., with a large attendance. President C. V. Wallace introduced E. G. C. Bleakley, city solicitor of Camden, who, in his talk, spoke on the way in which the general public left the responsibility to the operators of the trolley cars, depending on them for their safety and speed in being taken from town to town. He added that the trainmen not only received the pay which comes in an envelope but also that which comes from the appreciation of the daily riders, who place their confidence in these worthy men for work well performed. Martin Schreiber, manager of Southern Division Public Service Railway, outlined the plan of the Public Service Corporation under which it plans to sell \$2,000,000 of cumulative preferred stock to the general public and employees at the par value of \$100 per share, payable \$10 down and \$10 monthly. The stock is to pay 8 per cent, and 6 per cent is allowed during the time that payments are being made. He outlined also the many advantages to be derived from having the general public as part owners of the corporation.

Spraying Car Cleaner Fluid

AT THE Wheaton Shops of the Aurora, Elgin & Chicago Railroad H. A. Barbero, master mechanic, is working on a plan of using Wilson ONC cleaner by spraying it on under the 90-lb. shop air system pressure, instead of rubbing it on by hand. The hand method of cleaning takes four men about four hours per car. Experiment has gone far enough so that it is thought that four men will be able to clean a car in one hour with the spray method, assuming that proper equipment is afforded, including a tank at either side of the car. The present facilities at the shop are limited and it is necessary to place the car first on one track and then on another in order to get space in which to spray both sides. It is planned to build a shed outside of the shop particularly for car-cleaning.

The ONC cleaner is diluted with water and the car sprayed all over and then permitted to set about ten minutes. A wet brush on a long handle is then run over the car, windows and all, and they are rubbed as much as can be with this soft brush. The whole car is then rinsed down with a fountain brush. This latter process avoids the necessity of wiping the windows. The spray process requires about one-quarter more of the fluid than the hand process. At the same time, it saves considerable labor and provides a cleaner car, mainly because it will be possible to clean it more often with the same force of men. The present cleaning system is inadequate, though it is costing the company a large sum. At the Chicago terminal alone \$35 a day is being spent for cleaning cars on the inside only. It is planned ultimately to do away with this \$900 a month charge entirely at Chicago by concentrating all of the car-cleaning work at the shops, and it is believed that this can be done with the present working force under improved methods.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Railroad Labor Board Cuts Wages 12 per Cent

Highest Reduction of 18 per Cent on Section Workers Should Provide Stimulus to Track Construction

Reductions in the pay of railway workers averaging 12 per cent for all classes of employees have been authorized in the decision of the United States Railroad Labor Board handed down on June 1. The decrease becomes effective July 1, on which date the national working agreements are also abrogated. Nullification of these agreements, it is estimated, will mean a saving of about \$300,000,000 annually to the railroads of the country, while the wage decrease is expected to lop off about \$400,000,000 more.

The decision in general grants reductions of from 5 to 13 cents per hour or about 5 to 10 per cent, and reduces section laborers approximately 18 per cent, in this instance completely wiping out the increase in pay granted that class of employees in the \$600,000,000 wage increase of July 20, 1920. On other classes of workers, however, the wage reduction does not meet the increase in pay granted last year, and some disappointment over this has been expressed by the railroads. It is significant, however, that the largest decrease, or 18 per cent, affects section workers, for with lower costs in maintaining and constructing track, greater activity in this much neglected field may logically be expected.

Segregation of City and Suburban Lines Talked

While no definite future policy has been announced for the Detroit United Railway since the election of Harrison Williams and Alex Dow as directors, city officials believe that one of the main steps to be taken by the new organization will be the segregation of the city lines from the interurban system. It is also believed that the policy indicated by the company in agreeing to sell the day-to-day and non-franchise lines at such times as the city desired, and in agreeing to co-operate with the city in the matter of crossings by the municipal line, will be followed with a view to harmonizing the company and the city in the city's municipal program.

If complete harmony results, the disposal of the company's entire city system to the city would ultimately result in bringing about a unified municipal system, although it is not believed by city officials that a project to take over at one time the entire city system of the Detroit United Railway would be approved by the voters.

Following the defeat of the service-at-cost ordinance at the April election the company signified its willingness to allow the city to make crossings at the intersection of the municipal ownership lines and the company's lines. Agreement has been reached between the company and the city providing for submitting the matter of crossings to the United States Bureau of Standards.

The city officials hold that the company and city should share equally the cost of crossing non-franchise and day-to-day lines, while in general practice the junior system bears the entire cost. The Corporation Counsel claims that the company has no rights on such streets except by permission of the city.

D. U. R. in Charge of Administrative Committee

Announcement was made in New York on June 7 that the operating properties of the Detroit (Mich.) United Railway will be in charge of an administrative committee composed of Harrison Williams, New York, as chairman; Alex Dow, president of the Detroit Edison Company, recently elected a director of the railway; J. C. Hutchins, A. F. Edwards and R. W. Martin. This committee, just formed, will immediately consider the problem with which the Detroit United Railway is confronted. At the present time there is no announcement to make regarding any future plans or policies. It is not anticipated that any further changes will be made at this time in the board or in the operating organization.

Company attorneys do not accede this point and cite that the company is willing to sell the non-franchise lines on Fort Street and Woodward Avenue when the people vote to purchase them.

Third Des Moines Arbitrator Chosen

After more than a month's dickering in trying to secure a third arbitrator to hear the wage dispute between the Des Moines (Iowa) City Railway and its union employees Judge Scott M. Ladd, for many years member of the Iowa Supreme Court, was agreed upon by Rev. J. E. Kirby, for the men, and B. F. Elbert, for the company. By reason of the fact that Rev. Kirby plans to leave for Asia on June 22 it is thought that the wage dispute will now be pushed to a speedy settlement.

California Legislation Reviewed

Tax and Labor Bills Defeated Which Would Have Burdened Electric Railways Further

More than seventy bills were introduced at the recent session of the Legislature of California effecting directly or indirectly the electric railways of the state. The two most important measures were those dealing with taxation and hours of labor. A tax bill was introduced during the first half of the session providing for a uniform increase of 33 per cent in taxes of public utilities. As an illustration the bill proposed to increase the electric railways tax rate from 5½ per cent of gross receipts to 7 per cent.

This measure resulted in one of the bitterest fights that has ever been waged in the Legislature of California. The first bill having passed the Senate was defeated by a narrow margin in the Assembly, whereupon a very similar bill was introduced in the closing hours of the first half of the session.

During the thirty-day recess the Governor and his administration stumped the state in advocacy of the passage of this measure. The public utilities and the banks, however, carried on an intensive campaign taking the position that, first, public utilities and banks were paying their just proportion of taxes as compared with general property taxes; second, that the state government was extravagant. They presented figures to substantiate the first claim and submitted facts with respect to the second claim showing that the budget could be cut many millions without impairing the proper functioning of the state's business.

The second bill passed the Senate by a margin of one vote, but was defeated in the Assembly by a margin of four votes. On reconsideration, however, over a period of ten days the Governor's machine supported by the farmers' association (fearing an ad valorem tax on their property), automobile interests and labor organizations, the bill was finally passed by the necessary two-third vote which is required on revenue measures. The electric railways succeeded, however, by an amendment to the bill, in avoiding the increase tax, but their representatives refused to abandon the fight after their interests were excluded from the measure. Thus about \$3,000,000 will be saved to the electric railways during the next two years.

Companion bills providing for an eight-hour day within ten hours for electric railway platform men were introduced and were strongly supported

by representatives of the Amalgamated Association. The Senate bill was reported favorably out of committee, but was defeated on the floor of the Senate by three votes after a strenuous fight. The Assembly bill was then taken up in committee, amended to read nine hours within eleven and was defeated in committee.

The bill against the one-man car was not taken up, the author realizing that it could not be passed. The electric railways were involved in an amendment to the "full-crew act," which bill was defeated in committee. Numerous bills were defeated, limiting the Railroad Commission's power with reference to contracts and franchises. Other bills were defeated requiring gangways or sidewalks along bridges, prompt adjustment of damage claims, construction of caboose cars, septic toilet retainers, abolition of grade crossings. The electric railways were excluded by amendments to other bills affecting their interests.

The indeterminate franchise bill in which all public utilities were interested passed the Assembly by a substantial majority, but was not pressed for passage in the Senate, owing to strong opposition brought to bear by the Governor as a result of the defeat of a bill providing for a power commission and the fight made by the public utilities against the tax bill.

A bill was passed repealing the paving section in the state statutes, which should bring considerable relief to the electric railways providing the Governor can be induced to sign it. Several bills were passed affecting the jitney interests, requiring them to file reports of their operations with the Railroad Commission and subject to restrictions on the issuance of free and reduced transportation; also placing them under constitutional amendment No. 1, relating to taxation, under which other public utilities are classified for taxation, and a bill imposing a 2 per cent license tax on motor carriers, which will apply until the amendment to the constitution becomes effective.

A constitutional amendment reclassifying public utilities for taxation purposes was passed. This will enable the electric railways to be classified separately from the steam railroads. On this measure the contention was made that the electric railways should be given a lower percentage than that of the steam railroads owing to the additional burdens imposed in their franchise conditions.

It is interesting to note that the automobile interests maintained the largest lobby of any interests represented.

Wage Reduction to Be Made.—Britton I. Budd, president of the Chicago, North Shore & Milwaukee Railroad, has notified the employees of the company that effective on June 16 working conditions will be revised and wages reduced. The amount of the reduction and other changes to be made are under negotiation.

\$1,022,276 Program

Duluth Company Gives Details of Work to Be Carried Out in Next Two Years.

Improvements, extensions and new equipment involving expenditures aggregating \$1,022,276 are planned by the Duluth (Minn.) Street Railway within the next three years, according to schedules filed by the company with the State Railroad & Warehouse Commission supporting its previous request for an emergency fare of 7 cents or four rides for a quarter.

The program outlined includes several extensions which have been long contemplated, the construction of additions to the general shops at a cost of \$305,000 in addition to the purchase of considerable equipment and the relaying of several tracks.

In setting forth its financial condition, the company asserts that if it were forced to comply with the City Council's request of Jan. 10 last for increased service it would have to spend \$145,000 more annually for the increased cost of operation, or more than the company has been able to credit to profit and loss in any one of the last three years.

In addition, the company claims, it would have to lay out \$196,000 in new equipment and it now faces litigation in which the city is asking more than \$108,000 on account of paving about the track space on various streets.

A total of \$345,000, or approximately one-third of the total expenditure, is planned for 1921, in the event that the request for an emergency fare of 7 cents is granted. If the commission grants the emergency fare the new rate will hold until engineers employed by the city and by the company have presented their figures on the company's valuation. After that the law provides that the permanent rate of fare shall be based so as to permit a reasonable return on a fair valuation of the company's assets.

The classification of the proposed expenditure of \$1,022,276 for the next three years is briefly as follows:

	In 1921	
Relaying tracks account street paving.....	\$211,784	
Conduits and underground feeders.....	46,683	
Building improvements and renewals.....	23,134	
New tracks.....	11,400	
New equipment.....	55,000	
	In 1922 and 1923	
Relaying tracks, account street paving.....	\$88,745	
Conduits and underground feeders.....	8,270	
Building improvements and renewals.....	345,100	
New tracks.....	115,158	
New equipment.....	120,000	

The following is the income and expense account as presented to the state commission: in the new agreement. Arbitration of wages is not provided for in the new service-at-cost franchise.

	1918	1919	1920	1921*
Operating revenues.....	\$1,263,873	\$1,477,701	\$1,486,053	\$475,931
Operating expenses.....	984,717	1,215,092	1,203,314	380,460
Net revenue.....	279,156	262,609	282,739	95,471
Operating income.....	209,972	177,937	192,206	65,956
Gross income.....	226,317	196,222	212,130	73,059
Total deductions from gross income (interest on bonds, amortization and miscellaneous debits).....	127,311	125,382	125,618	41,734
Net income transferred to credit of profit and loss.....	99,005	70,840	86,511	31,325

* Four months.

New City Official Suggests Settlement

Corporation Counsel Rules City May Control Buses and Fix Adequate Fares for Railway

Judge Miller, the new corporation counsel at Des Moines, Ia., has pointed out the way for the settlement of the railway problem there. Individual members of the Council have also expressed their opinions freely, but tangible action still remains to be taken. It is generally agreed that a settlement must be brought about quickly if Des Moines is not to suffer irreparable loss through further disintegration of its railway system.

REMOVAL of equipment from the substations and central power station of the railway was simply a business arrangement to which the General Electric Company was forced by the inability of the railway to meet payments due on the equipment supplied by the manufacturer.

At the very time the General Electric Company was authorized by Federal Judge Martin J. Wade to seize the equipment approximately \$90,000 of the cost of the equipment remained unpaid. No criticism of the equipment was in any way attached and officials of the railway publicly announced that they could offer no objections to the General Electric Company starting suit to recover the property.

NEW FRANCHISE BURDENSOME

The entire Des Moines case offers an almost impossible situation to an unprejudiced observer, particularly one who is not a resident of the city. Five years ago, before the United States had entered the war that turned business conditions upside down, the railway sought and was granted a twenty-five year franchise with a fixed fare of 5 cents with six tickets for a quarter.

As the purchasing power of the dollar declined the railway, in common with many other public utilities, began to feel the pinch of the franchise rate provisions. In the summer of 1919 the question was submitted to the people of granting the company relief in the shape of a 7-cent fare. The proposition was defeated.

Shortly after this the North American Construction Company, Chicago, which had rebuilt the Des Moines plant, brought action to throw the company into the hands of a receiver, and since that time the company has been operated under the direction of the federal court with F. C. Chambers, general manager, and Homer A. Miller, a Des Moines banker, as receivers.

COURT INCREASED FARE

Last August Judge Wade over-rode the franchise provision and allowed a 6-cent fare. This failed to furnish sufficient revenue to meet wage awards secured to the men through arbitration and later there was a material service cut. A few months ago Judge Wade again reviewed the case and upon the agreement of the railway to increase service approximately 45 per cent he granted an 8-cent fare.

With the fare increased to 8 cents a flock of motor buses appeared, handling largely the short haul business and charging a nickel fare. By this time

wage and salary reductions were well under way and Des Moines in common with the rest of the country suffered a considerable business depression which to a great extent still prevails.

The bus operators pooled their interests and have a fairly compact organization. They operate almost exclusively along railway lines and have picked up the cream of the business. Their service, however, is intermittent and unreliable. As an example Des Moines had her heaviest snow of the winter after the middle of April. Buses were helpless until the streets had been cleaned by railway sweepers.

With their incomes decreased Des Moines people have looked at the 3 cents to be saved by patronizing the autos, have ignored the merits of the question and have ridden in the buses, with the result that for the past three months the railway has been operating at a deficit which has been increasing steadily.

When the General Electric Company refused to wait longer for payment on equipment supplied and Judge Wade allowed a 46 per cent service cut, fair-minded citizens were of the opinion that this would serve as the last straw and that the city would be so aroused that the agitators would be squelched and a way found to settle the difficulties.

PROBLEM ALLOWED TO DRIFT

To date this has failed to be the case. Des Moines has sat placidly back and let the railway problem take care of itself. It is true that a Chamber of Commerce-Greater Des Moines committee has three representatives working on a service-at-cost franchise and that a few organizations have held meetings but there has been no general popular demand for a solution.

The City Council has been as lackadaisical as the citizens and even in the face of advice from its new corporation counsel that it had the right to take the situation into its own hands, rule the buses off the street and fix a fare which would permit the railway to operate successfully, no real steps have been taken to bring the fare to an end. Five days have elapsed since Judge Miller sent his first communication to the Council and on June 6 he reiterated the opinion expressed by him previously, in answer to a newspaper editorial. There have also been newspaper interviews from individual members of the Council, but nothing tangible has been done.

More than a week ago the president of the bus owners' association said that

if the city would grant a franchise for a definite term of years they would put eighty buses in service and guarantee to handle the traffic. To date the matter has been entirely newspaper talk, and nothing has developed.

Judge William E. Miller, newly appointed Corporation Counsel in Des Moines, Ia., who has displaced H. W. Byers in charge of litigation between the city of Des Moines and its public utilities, forecast a complete change of front for the city in its relations with the Des Moines City Railway in a sweeping opinion which he filed with the City Council late during the week ended June 4.

Judge Miller not only advised the Council that it had full power to rule the buses off the streets, but that it had the power to increase railway rates without a vote of the people. He held that the franchise ordinance passed a few years ago was invalid.

Judge Miller suggests that the buses be ruled off the streets entirely or be compelled to operate on streets other than those occupied by railway tracks. A portion of his opinion is as follows:

Assuming that the city through its Council had and has power to regulate fares by franchise, contract or by ordinance (a power the city never had and does not have now), and assuming that the 5-cent fare and transfer privileges provided for do not yield a fair return to the owner, it would be within the power of the Council to change the fare provisions.

The state courts have held that a franchise ordinance or a contract between a city and public service corporations fixing a flat rate as is done in your ordinance No. 2406 is invalid. Cities such as Des Moines have no right to fix street car rates. The rate clause in the franchise ordinance No. 2406 is and always has been void.

It is manifest that the competition of the buses is proving ruinous to the railway. The company shows an estimated deficit of \$46,000 a month. A new franchise, however liberal in its general terms, would not remedy this condition if unfair competition were still permitted. Ordinances passed by the Council regulating buses could be revoked at any time. The way is open to you to remove the buses that are competitors destructive of the railway. It may be they could serve in other territory without material detriment to the car company. There is an obligation on the part of the city not to obstruct efficient car service.

I am inclined to believe, or at least to hope, that if the foregoing propositions are wisely and fairly handled a strong inducement would be furnished the owners of the Des Moines City Railway and its creditors to back the enterprise with additional funds and rehabilitate the physical property.

Judge Miller's stand is a complete opposite to the baiting methods adopted and maintained by Mr. Byers during his ten years as Corporation Counsel. It came as a surprise to members of the City Council when read to them in open meeting. No definite action was taken at the meeting.

Iowa Electric Railway Association

The Iowa Electric Railway Association will hold its annual meeting at "The Inn," Lake Okoboji (near Spirit Lake, Iowa), on June 24, 1921.

The Iowa Section, N. E. L. A., is holding its annual meeting at the same time and place, and it is intended that on Friday morning a joint session will be held to consider subjects of mutual interest and on Friday afternoon a separate "round-table" discussion of matters of particular interest to street railways will be conducted.

Wages Cut Materially in Jackson

New rates of wages were put into effect by the Michigan Railways, Jackson, Mich., on June 1. These rates in cents per hour compared with previous rates are as follows:

	June 1, 1920 to June 1, 1921	June 1, 1921 to June 1, 1922
City Divisions		
First twelve months.....	60	44
After twelve months.....	62	46
One-Man Safety Cars		
First twelve months.....	60	49
After twelve months.....	62	51
Interurban Divisions		
First six months.....	65	49
After six months.....	70	54
Extra Work		
Work in excess of regular runs	10 addl.	5 addl.

Extra men are not to participate in the 5 cents per hour additional until they have been in the service of the company for six continuous months. City men transferred to interurban work will participate in the 5 cents an hour additional after they have been in interurban service six months.

Wage Cut Proposed by Jersey Company

Thomas N. McCarter, president of the Public Service Railway, Newark, N. J., operating about 1,000 miles of line, has notified William Wepner, of the Amalgamated Association, that the company cannot renew the present contract with the men. That agreement expires on Aug. 1. The present scale calls for 51, 53, and 55 cents an hour. Mr. McCarter desires to revert to the award of 41, 43, and 45 cents an hour made by the War Labor Board in 1918.

In his communication to Mr. Wepner, Mr. McCarter says:

It must be apparent, I think, to you and your associates that these companies are not in a position to pay the rates of wages set forth in the draft of contract nor to continue after Aug. 1 the rate of wages now being paid.

While no distinct mention is made in the correspondence of the new scale sought by the men it is understood that the employees desire a continuation of the present rates, but seek important changes in the other terms of the operating arrangements. In their communication to Mr. McCarter the men, through Mr. Wepner, "respectfully insist that the financial condition of any company does not determine a reasonable and living wage and further protest that the profits of an industry shall not be obtained through the unreasonable lowering of any already very low standard of living."

Mr. McCarter refers to the recent unsuccessful effort of the company to obtain relief in the matter of advanced rates, also to the inability of the company to secure just consideration at the hands of the public authorities with respect to the regulation of the jitneys. In this connection he says:

Thus far, however, all its efforts have failed, and in addition to having had practically no money for the depreciation reserve account and none whatever for dividends it has lost upward of \$2,000,000 in operating the property in the last three years.

Mr. McCarter said in his communication that quite a number of matters of

lesser importance than the question of wages are referred to in the draft of contract submitted, and suggested that these could best be threshed out to a friendly basis of agreement by negotiations between the committee of the union and the company's own operating forces.

Byllesby Property Suffers Loss

The greatest damage to electric railways in the recent Colorado flood was suffered by the Arkansas Valley Railroad, Light & Power Company, a Byllesby property operating in Pueblo. This loss is estimated at \$100,000. One of the officials of the company has announced that electric current would be supplied by the Colorado Fuel & Iron Company. He said he was confident of being able to run the electric cars in a few days. Every attention is being given to equipping the local utilities so that operation will be resumed as early as possible.

News Notes

Railway Opportunity at Miami.—The Miami Chamber of Commerce and all other civic bodies, as well as the City Council, desire to secure an electric railway for the city. They will gladly assure their assistance in getting a franchise without restrictions as to rates, paving of streets or other outside expense. Additional information may be obtained from the City Council or the Chamber of Commerce.

Arbitrators Selected for Wage Matter.—The five arbitrators have finally been selected to hear the arguments of the Utah Light & Traction Company, Salt Lake City, Utah, and its employees over the proposal of the company to reduce wages 25 per cent. The five arbitrators are: George H. Dern, the neutral member; A. L. Hoppaugh and Stephen H. Love, representing the traction company, and George H. Islaub and James H. Wolfe, who represent the employees. The first session of the arbitration board was held on May 27.

Interurban Men Accept Cut.—Trainmen and freight handlers and motormen and conductors of the Cincinnati & Dayton Traction Company, Hamilton, Ohio, have accepted a decrease in wages after the matter had been referred to arbitration. Affecting approximately 150 employees the reduction makes a decrease of 5 cents an hour in wages of freight helpers and of 3 cents for motormen and conductors. Although the trainmen demanded 80 cents an hour, where they were receiving 51 cents, arbitration resulted in trainmen being offered 48 cents and freight helpers 40 cents an hour, commencing on June 1.

Program of Meeting

C. E. R. A. Summer Meeting

The tentative program for the summer meeting of the Central Electric Railway Association, which is to be held on board the S.S. *South American* en route from Toledo to Chicago by way of Lake Huron, St. Mary's River, the "Soo" Locks, Mackinac Island, Lake Michigan, Green Bay, Sturgeon Bay and Benton Harbor, has been drawn up by the program committee, of which Sam W. Greenland, Fort Wayne, is chairman.

Two formal sessions have been arranged, one on Wednesday morning, June 29, and one on Thursday afternoon, June 30. The subject that will be treated on Wednesday morning is "Automatic Substations," led by a paper by C. A. Butcher, Westinghouse Electric & Manufacturing Company. As there has been a feeling on the part of a number of the electrical engineers that there has not been opportunity at any meeting to give this subject the full discussion warranted, and as this subject is now up for very keen study in many cities and on many interurban lines, the committee has planned that ample time shall be given for a full discussion. Several written discussions will be presented by men particularly able and experienced in this study and several other electrical engineers are taking the trip expressly to hear this discussion and to take part in it.

On Thursday afternoon the theme is to be "Merchandising Transportation." This subject will be led off by the report of the Committee on Education and Training of Employees, of which James P. Barnes, Louisville, is chairman. Mr. Barnes has been giving the training of employees, particularly that phase of the subject looking to their functioning as salesmen for the company, a great deal of study, and it is expected that he will have some very worth-while thoughts to express to the association.

Arrangements are being made for running several special cars from various points in Indiana and Ohio to Toledo or Chicago, where the members will embark on the cruise. As a great many of the members desire to make the entire trip from Chicago to Toledo and return, leaving Chicago Sunday morning, June 26, at 8:30 a.m., it is expected that some of these special cars will be routed to Chicago. The committee on arrangements, for which John Benham, 15 South Throop Street, Chicago, is acting as secretary, reports that reservations from the railway men are coming in satisfactorily and that every effort is being put forth to furnish plenty of entertainment and to insure a highly successful meeting and trip. As the meeting of the association which voted to have a boat trip this summer was unanimously and enthusiastically for the boat trip and was unwilling to substitute anything else it is expected that there will be a large attendance.

Financial and Corporate

New Bedford Earnings Gain

Nearly 12 per Cent Return on Capital Stock from a Five-Cent Basic Fare

The annual statement of the Union Street Railway, New Bedford, Mass., shows a surplus of \$92,630 after payment of 8 per cent dividends on capital stock for the year ended Dec. 31, 1920, as compared with a deficit of \$28,435 the previous year. This is especially notable as the city lines are still being operated at a 5-cent fare. During the year, however, transfers were eliminated, and a traffic center in the heart

rial cost which prevailed was offset to a large degree by the thorough co-operation of the cities, towns and municipalities along the line (particularly by the chambers of commerce and boards of trade at these places), together with the active and earnest consideration of the employees. With such co-operation it was possible so to operate the properties as to serve the people better and earn fixed charges.

Much, however, has yet to be done to give better car service to meet the demand for transportation in this rapidly growing industrial community, and it is expected that with the continued co-

INCOME STATEMENT—UNION STREET RAILWAY COMPANY

Year ended Dec. 31	1920	1919	Per Cent Change
Gross earnings from operation.....	\$1,729,396	\$1,439,769	20.12
Operating expenses.....	1,303,582	1,123,851	15.97
Net operating revenue.....	\$425,814	\$315,918	34.80
Non-operating income.....	3,570	1,090	227.00
Gross income.....	\$429,384	\$317,008	35.4
Deductions from gross income:			
Interest on funded debt.....	\$11,250	\$11,250	....
Interest on unfunded debt.....	16,510	16,076	\$2.70
Taxes.....	113,994	123,118	7.41
Total deductions.....	\$141,754	\$150,444	5.77
Net corporate income.....	\$287,630	\$166,564	72.80
Dividends, 8% on \$2,437,500 capital stock.....	195,000	195,000	....
Surplus for the year.....	92,630	28,436	....
Surplus end of preceding year.....	322,314	402,782	....
Adjustments of losses and depreciation.....	2,511	52,092	95.2
Surplus end of current year.....	\$412,433	\$322,314	28.0

STATISTICAL INFORMATION—UNION STREET RAILWAY COMPANY

	1920	1919	Per Cent Increase
Number of revenue passengers carried.....	31,730,868	27,354,946	16.03
Number of revenue passengers per mile of main track.....	755,496	592,552	27.50
Passenger car-miles run.....	3,046,484	3,015,824	1.02
Number of employees as of Dec. 31.....	514	480	7.08

Italics indicate deficit or decrease.

of the city was established, beyond which a second 5-cent fare is charged. This company also operates a 14-mile suburban line between New Bedford and Fall River, on which a 25-cent fare is charged. The company owns and operates two summer amusement parks which it reports are self-supporting. According to the 1920 census, New Bedford has a population of 121,217.

Fixed Charges Earned by Beaver Valley Line

According to the annual report of the Philadelphia Company two of its subsidiary traction properties, the Beaver Valley Traction Company and the Pittsburgh & Beaver Valley Street Railway, were operated very successfully during the year, and at a time most difficult to formulate and carry out a new policy.

During the year, the report says, a new 5-cent zone fare system was established with the zones located to take care of the short haul travel within the various boroughs. The unusual condition of high labor cost and high mate-

operation of employees and the public-spirited citizens it will be possible to improve the service constantly, so that within a reasonable time every proper demand for these facilities can be met.

Gross earnings for the calendar year were \$705,242, an increase of \$114,136, or 19 per cent more than those for the previous year, while the net income of \$3,189, together with certain credit adjustments, enabled the deficit, which at the commencement of the year amounted to \$342,243, to be decreased by \$16,222. The car mileage operated during the year was 1,544,335, an increase of 21,583 miles, or 1.4 per cent over the previous year.

Five new safety cars for one-man operation were purchased during the year and have proved satisfactory in every respect. Thirty per cent of the price was paid upon delivery, and the remainder will be paid from earnings. It is expected further to increase the number of such cars in service so that a more frequent service can be provided. This increase in service, it is hoped, will be reflected in the earnings.

Wider Securities Market

Representatives of N. E. L. A. and Members of Chicago Stock Exchange Discuss Plan

At a conference between representatives of the National Electric Light Association and members of the Chicago Stock Exchange in Chicago on June 1, at the time of the annual convention of the N. E. L. A., plans were discussed for establishing a wide market in Chicago for public utility securities. The plan would be to list on the Chicago market all of the leading utility securities of the country, give publicity to utility companies and create a broad market for the securities of these companies. It was pointed out that while there are \$21,000,000,000 of these securities in the hands of the public there is an open market now for only a small portion of such issues.

Samuel Insull, president Commonwealth Edison Company and other utilities, said:

There can never be a real market in utility securities until we have a free and open market. Take the Commonwealth Edison Company. Its various issues are listed, and its securities have never been more easily salable. I am a very strong believer in the public having the full light of day shed on any of the affairs of the utilities with which I am affiliated, and that comes when the securities are listed. I believe it would do the utility industry good. Chicago is the natural place for such a market and I welcome any interest bringing its securities to Chicago for sale.

It is the plan of the members of the Chicago Stock Exchange and the bankers to go ahead at once with the work of broadening the market for utility securities in the hope of making Chicago the great central market for utility securities just as Boston is for the coppers.

Suspension Suggested Pending Better Business

The North Carolina Public Service Company has thrown itself on the mercy of the State Corporation Commission with respect to the future operation of its lines in Concord. The lines there consist of 3 miles of track and 3 cars. An 8-cent fare is charged. The population served is less than 10,000.

The plant with all equipment is valued at \$123,000. Last year the company spent \$1,800 in actually running the cars, and \$5,000 more on paving required in the franchise. Business is still falling off with the idleness of many of the cotton mills, and the owners of the property seek the advice of the commission with respect to the future of the road.

Ten-cent fares were suggested as a remedy, but neither the commission nor the municipal authorities thought that 2 cents added to present rates would materially increase the gross income. It was suggested that the line suspend temporarily business in the hope of better conditions, but this plan was not generally acceptable. No further suggestion was offered, and the commission took the matter under advisement.

Answers to Accounting Questions

Another Series of Questions and Tentative Answers Under the Uniform System of Accounts for Electric Railways

Another series of tentative answers to questions raised in connection with the uniform system of accounts, prescribed by the Interstate Commerce Commission, has just been issued. As these answers have not received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission.

THE case numbers covered below are from A-565 to A-587, with certain omissions. Other installments will follow. The omitted numbers represent cases which either are not of sufficient importance to justify publication or involve questions upon which a definite conclusion has not been reached.

Q. (A-565). To what account should be charged the pay and expenses of a detective employed to recover stolen feed wire and to apprehend the thieves?

A. To account 23, "Miscellaneous electric line expenses."

Q. (A-566). To what account should be charged the excess of liabilities over assets acquired in connection with the purchase of a road?

A. The excess shall be considered as part of the purchase price and charged to account 527, "Cost of road purchased," from which it shall be cleared to the appropriate primary accounts as provided in the text of that account.

Q. (A-567). To what account should be charged the cost of water supplied to an automatic sprinkler system in car barns?

A. To account 24, "Buildings, fixtures and grounds."

Q. (A-568). A carrier's coal crane is occasionally used by others for unloading their material. To what account should be credited amounts received for such use?

A. To account 117, "Rent of buildings and other property."

Q. (A-570). To what account should be charged the pay of a watchman at a power plant, the operation of which has been suspended?

A. To account 52, "Power plant employees."

Q. (A-571). A carrier pays dues of its officers and other employees in various clubs, business organizations, and associations. What should be the accounting?

A. Dues of traffic associations are chargeable to account 82, "Miscellaneous traffic expenses." Dues of other railway associations are chargeable to account 89, "Miscellaneous general expenses." Dues paid to other organizations for employees not in connection with the general management of the company shall be charged to the accounts to which their pay is charged.

Q. (A-572). The tax on income of a given year is not payable until the succeeding year. In the accounts of which year should the charge be made?

A. The tax is chargeable and should be set up by accruals in the accounts of the year in which the income accrues.

Q. (A-573). To what account should

be charged the loss, other than depreciation, on a passenger car converted to a service car?

A. Loss assignable to the period subsequent to July 1, 1914, shall be charged to account 41, "Equipment retired," and loss assignable to the period prior to that date shall be charged to profit and loss account 315, "Loss on road and equipment retired." (See Cases 183 and 315, Accounting Bulletin 14.)

Q. (A-575). A carrier acquires an option on a piece of property, the consideration for the option being an immediate partial payment and payment of interest on the remaining amount of the agreed purchase price. What is the correct accounting?

A. The amount paid for the option, together with the interest accrued, shall be charged to account 420, "Other unadjusted debits," and carried therein for the period the option is pending. No entry shall be made during that period for the full cost of the property to which the option pertains. If purchase is consummated the amounts charged to account 420 shall be transferred to the appropriate asset account. If purchase is abandoned the amount in suspense shall be charged to account 317, "Miscellaneous debits."

Q. (A-577). A carrier's operations of miscellaneous physical property show in some months a net income and in other months a net loss. What is the proper method of using accounts 205, "Net income from miscellaneous physical property," and 219, "Net loss on miscellaneous physical property," in connection with these operations?

A. Ledger accounts may be set up to show separately the revenues and expenses of the operations, and when periodical or annual income statements are made the net balance of the two accounts shall be assigned to account 205 or to 219, as may be appropriate.

Q. (A-578). To what account should be charged the net loss sustained on account of the destruction of foreign freight cars in the carrier's revenue service?

A. To account 31, "Freight, express and mail cars."

Q. (A-579). A carrier has installed coasting clocks—devices attached to cars for registering operation without power. What accounts should be charged with maintenance costs, supplies for operations and pay of clerks recording the results?

A. The cost of repairs and renewals is chargeable to account 33, "Electric equipment of cars"; the cost of motor-men's keys to account 67, "Miscellaneous car service expenses"; and the cost

of tape and ribbons for clock records to account 94, "Stationery and printing." Pay of clerks engaged on clock records, if employed in the general office, is chargeable to account 84, "Salaries and expenses of general office clerks," or to account 63, "Superintendence of transportation," if employed in other offices.

Q. (A-580). What disposition should be made of loss in connection with the retirement of property the cost of which is classable in accounts 536, "Shop equipment," 537, "Furniture," and 538, "Miscellaneous equipment?"

A. These accounts are grouped under general account II, "Equipment," and the retirement of property charged thereto shall be in accordance with the rules prescribed for the retirement of property chargeable to accounts 530 to 535, inclusive, as shown at the top of page 102 of the Uniform System of Accounts. The difference between the original cost of equipment and the salvage recovered shall be prorated on the basis of the life in service prior and subsequent to July 1, 1914, and the difference between the amount thus determined to be applicable to the period prior to July 1, 1914, and the amount of depreciation for such prior period for which accounting has been made, shall be adjusted through profit and loss account 315, "Loss on road and equipment retired." The difference between the amount determined to be applicable to the period subsequent to July 1, 1914, and the amount of depreciation which had been accrued for such period shall be adjusted through operating expense account 41, "Equipment retired."

Q. (A-583). A carrier purchases the power it uses and incidentally sells small quantities of the current purchased. To what account should the amount received from the sale of current be credited?

A. To revenue account 118, "Power."

Q. (A-584). To what account should be charged war taxes paid on transportation charges for material and supplies?

A. War taxes, when assumed as such, on express charges or on foreign line freight charges on company material shall be charged to account 215, "Taxes assignable to railway operations," except that these taxes when in connection with road and equipment projects, if assignable, shall be charged to account 549, "Taxes," in accordance with Note C to account 215. (See Cases 589 and 598 (a).)

Q. (A-586). What accounts should be charged with a bonus paid to all employees?

A. The amount of such bonuses shall be included in the same accounts as the wages or salaries of the employees to whom the bonuses are paid.

Q. (A-587). To what account should be charged the cost of compiling lists of employees subject to income tax, to be rendered to the Federal government?

A. The pay of clerks engaged on the work is chargeable to account 84, "Salaries and expenses of general office clerks." The cost of stationary supplies used is chargeable to account 94, "Stationery and printing." (See Case 80, Accounting Bulletin 14.)

\$650,000 for Needed Improvements

Directors of the Cincinnati (Ohio) Street Railway have approved the plan to lend their credit to the extent of \$650,000 to the Cincinnati (Ohio) Traction Company to enable the latter company, which leases the Cincinnati Street Railway, to make needed improvements.

The Cincinnati Street Railway has increased its directorate by electing Judge Rufus E. Smith and Charles F. Windisch members of the board. This makes a total of eight on the board. Samuel Assur was elected second vice-president, while Bayard Kilgour remains as president. Looking toward the early solution of the traction problem a committee composed of Judge Smith, C. W. Dupuis and Robert A. Taft, all members of the board of directors, was named to make special investigation of the traction situation.

This committee with the addition of the new members of the board and the appointment of Mr. Assur as vice-president are in line with the new policy to take an active interest in the developments of the railway situation in Cincinnati.

\$15,500,000 Increase in Authorized Stock at Milwaukee

Holders of more than two-thirds of the outstanding stock of the Milwaukee Electric Railway & Light Company voted on May 25 to amend the articles of incorporation to provide for an increase of \$15,500,000 in the company's authorized capital stock and to increase the number of directors from nine to twelve. The dividends on the \$4,500,000 of 6 per cent non-cumulative preferred stock now outstanding will be cumulative from and after Jan. 31, 1921.

The authorized stock as increased will consist of \$4,500,000 of 6 per cent preferred stock, \$15,500,000 of preferred stock, issue of 1921, and \$20,000,000 of common stock. There has previously been outstanding \$4,500,000 of 6 per cent preferred stock and \$9,850,000 of common stock. The new preferred stock will be cumulative at not more than 8 per cent and redeemable at not less than par nor more than 110 as fixed by the directors. It will share ratably with the present preferred stock in the rights to cumulative dividends and in the preference over the common stock in liquidation, but will be non-voting except in the event of default of dividends, differing in that respect from the existing 6 per cent preferred stock, which now has and will retain full voting rights.

Additional financing is proposed through the issue of new preferred stock. It is planned to sell \$3,000,000 of the new preferred stock, issue of 1921, bearing dividends at 8 per cent and redeemable at \$103 per share, to enable the company to obtain funds to retire floating debt incurred for extensions and to permit the company to invest in additional facilities required

to furnish the necessary service in various communities.

At a subsequent meeting held on May 28 the following were added to the board: S. B. Way, vice-president and general manager of the company; Edwin Gruhl, vice-president of the company and of the North American Company, and F. L. Dame, New York.

City's Attitude Governs Reorganization Prospects

The annual report of the Philadelphia Company for the year ended Dec. 31, 1920, makes the following comments on the Pittsburgh situation:

The Pittsburgh Railways remained in the hands of the courts and receivers throughout the year. They made considerable progress in rehabilitating tracks and equipment from earnings, but failed to pay all fixed charges that accrued, and the Philadelphia company was called upon to pay interest due on some of the guaranteed bonds.

The petition of the Philadelphia Company to have returned to its treasury \$495,000 which had been advanced the previous year for bond interest is still in the hands of the court. The same condition prevails as to some of the claims of the city of Pittsburgh.

The receivers have clearly demonstrated that some form of financing for new money with which to rehabilitate the property must take place before any marked improvement can be shown in the betterment of the property and the service to the public, as sufficient money for this purpose cannot accrue through earnings. The receivers also report the necessity for immediately adding 150 new cars to the equipment. More than five years have now passed since any new cars were placed in service.

It is recited that some progress has been made toward reorganization, but the opinion is expressed that before a successful reorganization of the properties can take place a definite attitude toward the railway will have to be assumed by the city officials and officers of the municipalities served. This is necessary in order to establish a transportation system which will give adequate service to the public. Because of the physical condition of the properties the problem of successful rehabilitation is a difficult one.

Merger Differences Irreconcilable

Despite the fact that at one time the prospects appeared to be bright for reaching a basis of understanding upon which the Washington Railway & Electric Company and the Capitol Traction Company might be induced voluntarily to merge, all hope of such merger at this time appears now to have vanished. In fact the local Public Utilities Commission, before which possible details were discussed, has issued a statement to the effect that the differences between the companies "are so great as to be irreconcilable."

It is said now that the only remaining possibility for a union of the two railways rests with the committees of Congress. Even this, however, appears very remote, for the Washington Post, which has been following the negotiations at much length in its columns, says that "even there the drafting of legislation on the subject probably will prove as difficult a job as that faced by the commissioners in attempting to get the companies to unite voluntarily."

Interurban Saved from the Scrap Heap

Application has been made to the Public Service Commission by the reorganized Buffalo & Depew Railway, Buffalo, N. Y., for permission to operate the interurban line between Genesee Street at the city line of Buffalo to Cheektowaga, Depew and Lancaster. The new company which has taken over the line from the receiver is the Depew & Lancaster Railway Corporation. It is capitalized at \$200,000. The purchase price was \$6,250 plus taxes due to various towns and villages, aggregating about \$40,000.

Action on the petition has been deferred temporarily. The commission's experts will first report their findings in an examination of the physical properties and approval also must be given for the sale of the line.

John J. Lenahan & Son, 53-61 Fulton Street, Buffalo, bid in the property. Instead of junking the road as was the original intention, Mr. Lenahan and his associates will rehabilitate the line and operate it in competition with the International Railway - Buffalo - Depew-Lancaster division.

It is reported the villages and towns along the line have agreed to waive the back taxes in return for an agreement from the new company to operate the railway for a period of at least three years.

Interstate Road Sold at Foreclosure

The property of the Northampton Traction Company, running between Easton, Pa., and Phillipsburg, N. J., has been sold for \$430,000 to C. S. Newhall, Philadelphia, chairman of the bondholders' protective committee. Mr. Newhall also purchased the right, title and interest of the company in \$100,000 of second mortgage bonds; \$44,000 of first mortgage bonds; \$81,500 of third mortgage bonds, all of which were deposited by the Northampton Traction Company as collateral security under a mortgage given by the Northampton, Easton & Washington Traction Company to the Bankers' Trust Company, New York, as trustee; \$130,000 of second mortgage bonds of the Bangor & Portland Traction Company deposited as collateral security under agreement made with the Easton (Pa.) Trust Company, as trustee; \$23,000 of bonds issued by the company under a fourth mortgage and pledged as collateral for the payment of certain loans due various banks; 2,600 shares of the capital stock of the Bangor & Portland Traction Company and 10,793 shares of the Northampton, Easton & Washington Traction Company.

Interurban Sold Under Foreclosure.—The Philadelphia & Eastern Electric Railway, operating between Doylestown and Easton, Pa., has been sold under the hammer for \$200,000 to John E. Snyder, Lancaster, Pa., representing the bondholders. The line is approximately 34 miles long.

Commission Checking New Jersey Valuation Figures

The Board of Public Utility Commissioners of New Jersey is now engaged in going over with its engineers records and other data used as a basis by Ford, Bacon & Davis in reaching their findings with respect to the valuation of the property of the Public Service Railway and the Trenton & Mercer County Traction Corporation. The board had previously ruled that without information of this kind it could not provide an opportunity for cross-examination on the appraisal.

The valuation by Ford, Bacon & Davis, made at an expense of \$100,000 to the State, was started under a special legislative act which provided that the findings of the engineers selected by the special valuation commission which the act created should be accepted by the Public Service Commission without review as a basis for fixing rates. While the valuation was in progress, however, the act was amended by the new legislature to require the acceptance of the valuation by the Utility Commissioners only as presumptive evidence.

In consequence of this change the utility commissioners at recent public hearings called upon the engineers for the original documents upon which they based their findings as to values. At these hearings it was brought out that among other information upon which the engineers had drawn for their guidance was the appraisal of the Public Service Railway as made for that company by Dean Mortimer N. Cooley. Other hearings will be held after the engineers for the commission have had an opportunity to check unit figures used by the valuation engineers with those found by the engineers of the commission for certain property accounts.

Financial News Notes

Rails Will Be Taken Up.—The Fresno (Cal.) Interurban Railway is planning to dismantle its line. Automobile competition has made the operation of the electric railway practically impossible.

Receiver for Subsidiary.—Patrick A. Barry, Mt. Vernon, Ohio, has been appointed receiver of the Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, controlled by the Ohio Electric Railway, already in the hands of receivers. The appointment was made on the application of the Girard Trust Company, Philadelphia, which charges default of the railway in the payment of interest on \$1,211,000 of twenty-year bonds issued in 1906. The trust company asks that the mortgage be foreclosed, the railway property sold

and proceeds applied to the payment of the bonds.

Texas Property Sold.—The property of the Corpus Christi Railway & Light Company, Corpus Christi, Tex., was sold at public auction on May 27 by R. U. Culberson, receiver. The railway and the lighting plant were first offered jointly, but as there were no bidders the auctioneer separated the two and offered the railway first. This was purchased by Claud Pollard, Houston, acting in his own behalf, on a bid of \$500. Mr. Pollard said the purchase is made preparatory to scrapping the line unless local men are willing to raise money to guarantee operation without loss or will lease the line and operate it themselves.

Railway Property to Be Sold.—The property of the United Traction & Electric Company, Providence, R. I., will be sold under a decree of foreclosure in Providence on June 24. It is believed that the property will be bought in for the United States Electric Railways, the successor company. This latter company recently petitioned the Public Utilities Commission for permission to issue about \$21,000,000 in stocks and bonds. The commission will consider the proposition at a public hearing on June 14.

Power Plant Sold to Light Company.—Following approval of the Railroad Commission of California the San Diego Consolidated Gas & Electric Company has issued and sold to H. M. Byllesby & Company, Harris Trust & Savings Bank, and Blyth, Witter & Company an issue of \$2,750,000 of first and refunding mortgage 6 per cent gold bonds, due March 1, 1939. Proceeds of the issue will provide needed improvements and extensions to the company's present gas and electric generating equipment, transmission and service facilities. A part of the improvement program provides for the purchase of the power house of the San Diego Electric Railway with 8,200 kw. of installed capacity and for the enlargement and improvement of this station.

Accumulated Deficit \$163,688.—The gross revenue of the Memphis (Tenn.) Street Railway in April, 1921, was only \$266,729, as compared with \$271,156 in April, 1920, when the company was operating on a 6-cent fare. The number of revenue passengers decreased from 4,484,919 to 3,836,639. Although the wage scale now in effect is much higher than that in force a year ago, L. LeMay, secretary-treasurer of the company, says that the operating expense during the month just ended was only slightly in excess of that of April, 1920. The cost of coal and other supplies and equipment is much lower than during the same period last year. The April deficit was \$8,067. This brings the total deficit in the fare index fund from July, 1920, to May 1, 1921, to \$163,688.

Additional Issue Authorized.—The Transit Commission of New York recently issued an order permitting Lindley M. Garrison, receiver of the Brook-

lyn Rapid Transit Company, to issue an additional \$3,000,000 in receiver's certificates. An extension of time was also allowed on \$15,000,000 receiver's certificates from Aug. 1 to Feb. 1 next. Judge Mayer in the United States District Court signed the decree for maturity extension and in his decision reviewed the improvements undertaken by the company through the aid of receiver's certificates. Since August, 1919, he pointed out that 300 subway cars had been built, the reconstruction work on the Brighton Line between Church Avenue and Malbone Street had been completed and various terminals and power houses have been finished.

City Buys Trolley Liens.—New York City, through the Collector of Assessments and Arrears, recently bought at public sale franchise-tax liens on nineteen lines of the New York Railways and the Third Avenue Railway with a face value of \$1,628,508. The railways still have three years to redeem the franchise by tax payments with interest. Protests were made against the sale. Among them was one from Job E. Hedges, receiver of the New York Railways, who contended that the taxes demanded exceeded those justly due. What disposition the city will make of the liens has not been disclosed.

Columbus Bonds Offered.—Stockholders of the Columbus Railway, Power & Light Company, Columbus, Ohio, have authorized the issuance of \$2,700,000 in 5 per cent first refunding and extension bonds for the purpose of retiring a similar amount of general mortgage bonds bearing 6 per cent interest, issued in June, 1920. At that time, also, the company was authorized to issue \$2,500,000 in refunding and extension bonds, which with the new issue brings the total of such bonds to \$5,200,000. The new issue had been authorized by the State Public Utilities Commission a few days before. The stockholders voted to accept the offer of Harris, Forbes & Company, New York, N. Y. The bonds have since been offered for subscription.

\$4,180,000 of Acquisition Bonds Authorized.—On May 24 the Western Pacific Railroad was authorized by the Interstate Commerce Commission to issue and sell at not less than 85 per cent of par \$4,180,000 of first mortgage gold bonds to acquire the Sacramento Northern Railroad, an interurban electric railway in the vicinity of Sacramento, Cal. The Western Pacific also proposes in event of acquisition to construct certain extensions to the property at an estimated cost of \$3,000,000, and is expected to apply to the commission within sixty days for authority to issue \$3,000,000 of its first mortgage bonds for that purpose. Although authority was granted for issuance of the bonds for the declared purpose of acquiring the properties the commission made clear it had not finally passed on the question of acquisition. "The merits of such acquisition are not now in issue," the announcement said, "and we express no opinion on that question." A further hearing is to be held.

Traffic and Transportation

Readjustment in Dubuque— Lower Fares, Lower Wages

In view of the great reduction in patronage during the last six months on the lines of the Dubuque (Ia.) Electric Company, the management has found it necessary to cut the wages of its employees as the only possible way of reducing operating expenses. On May 4 the following modifications in rates of pay in cents per hour went into effect in the platform wage scale:

	New	Old
First six months.....	35	38
Next six months.....	38	44
Second year.....	41	50
Third year and thereafter.....	45	60

A copy of the bulletin listing the changes was posted at the carhouse and was also given to each employee individually. The day previous to the posting of the bulletin the notice was submitted to the Mayor, the City Manager and Aldermen, at whose instance a lower ticket rate was placed in effect for a trial period as another readjustment measure. The rate was changed from seven tickets for 50 cents to four tickets for 25 cents—the cash fare of 8 cents remaining the same.

In its statement the company said that it was unfortunate that the great bulk of the expense carried was represented by wages and that any material reduction in expenses could not be accomplished without a reduction in wages. Moreover, the company contended that it was extremely questionable whether revenues would be proportionately increased if the fare were higher, because riding, already at a low ebb, might be still further discouraged.

Reduced Fare Authorized— Rerouting Plans Under Way

The Indiana Public Service Commission has formally issued the order authorizing the Indianapolis (Ind.) Street Railway to return to the straight 5-cent fare with a 2-cent transfer. The likelihood of this ruling was referred to in the *ELECTRIC RAILWAY JOURNAL* for June 4. The new fare takes the place of a 6-cent cash fare, twenty tickets for \$1, together with a 1-cent transfer. The lower fares will be tried out in the hope of reducing jitney bus competition, which has greatly affected the receipts of the railway.

Rerouting the line of the railway, which was one of the conditions upon which the Public Service Commission ordered a return to the 5-cent fare, will be effected gradually one line at a time. David E. Matthews, chief railroad inspector of the commission, has been placed in charge of the rerouting. He will meet with the City Council soon to consider the first change in routes.

The rerouting is to be done in an effort to enable the company to check the inroads of the jitney bus. During the period until Aug. 1, while the rerouting plans are being worked out, the 5-cent fare and 2-cent transfer charge will be effective.

Officials of the railway have indicated that they will co-operate to the fullest extent with state and city officials in revising the routes to improve service. In addition to the rerouting of cars the commission will take up the question of the improvement of service during rush hours. In working out the rerouting plans the commission experts probably will consult with officials in other cities. It may even be found advisable, it is said, to call in engineers familiar with such problems to advise on the matters that arise.

Connecticut Roads Authorized to Run Buses

The Governor of Connecticut has affixed his signature to a bill authorizing electric railways to own and operate motor vehicles for hire. The text of the measure follows:

Sec. 1. Any street railway company may acquire, own and operate motor vehicles running upon a regular route and carrying passengers between the termini or over any intermediate portion of such route at a regular stipulated individual or per capita fare. Any company which shall exercise the authority conferred by the provisions of this act shall be subject to the supervision and control of the Public Utilities Commission to the same extent and in the same manner as with respect to the business of transporting passengers and property by means of street railway cars.

Sec. 2. This act shall take effect from its passage.

J. Moss Ives, receiver for the Danbury & Bethel Street Railway, announced in the Superior Court at Bridgeport on June 3 that his company would take advantage of the new law and try out the feasibility of operating buses in place of trolleys over portions of lines which have proved unprofitable.

City of New Orleans Asks for Further Evidence

The Commission Council of New Orleans, La., has made answer to Receiver O'Keefe of the New Orleans Railway & Light Company, in the injunction suit restraining the city from interfering with him in the collection of an 8-cent fare. It is alleged by the city that no proof has been tendered by the receiver that subsidiary corporations of the railways are bound by agreements under the parent concern and in the alternative the court is asked to compel the receiver to produce all contracts, agreements and leases between the railway and the subsidiaries. It is further alleged that the company has not been operated efficiently and economically.

Jitney Regulation Bill Vetoed in Wisconsin

Governor John J. Blaine of Wisconsin has vetoed the so-called Perry jitney bill. This measure would have placed all motor buses and jitneys operating in the state under the jurisdiction of the Wisconsin Railroad Commission and would, as it is claimed, have virtually put the motor bus lines in the state out of business. In his message explaining the veto Governor Blaine stated that his objection to the bill was that it undertook to regulate in a field "where free competition serves the public welfare best."

The Governor pointed out that the law as it now stands requires motor vehicles to furnish adequate service at reasonable rates. He is reported in part as follows:

My objection to this bill is fundamental. Jitneys and buses may be operated by anyone, and, therefore, there is no opportunity to create a monopoly. It is quite different with respect to a street railway, an interurban railway, or a railroad. There is a limitation on the number of such roads that may occupy the field for transportation.

Wisconsin has spent \$42,000,000 on highways in the last ten years, and the people were led to believe that they would receive returns from such investment in better transportation, greater convenience, and in economy of service. The motor vehicles have come to stay; they are the beginning of a transportation system about which it is dangerous to prophesy. My objection, therefore, to this bill is that it undertakes to regulate in a field where free competition serves the public welfare best.

Mayor Seeks Reduction of Fares in Detroit

Action has been started by Mayor Couzens of Detroit, Mich., with a view to bringing about a reduction of fare on the city lines of the Detroit United Railway and having the company cash the rebate slips issued with tickets purchased during the past year. In a letter addressed to Allen F. Edwards, acting president of the Detroit United Railway, the Mayor asks that a conference be arranged for an early date to consider the matter of reducing the fare to 5 cents. Another letter was addressed by the Mayor to the Corporation Counsel asking him to arrange a conference with the company's attorneys regarding the refund of money by the company.

The basis for his action, according to the Mayor, is the fact that the audit of the company's books for the city indicates that the increased revenue resulting from the increase in fares from 5 cents to 6 cents cash, or nine tickets for 50 cents, has exceeded by more than \$507,523 the amount used to offset the increase in wages granted to the railway employees.

In the letter to Mr. Edwards the Mayor cites the fact that practically a year has elapsed since the company was granted an increase in rate for the purpose of paying increased wages to the platform men and he states that in view of the fact that on May 1 the wages were reduced to the point where they were prior to last June, consideration should be given to the matter of reducing fares to the rate existing prior to June 9, 1920.

Six Cents in Los Angeles

Return of 7.4 Per Cent Allowed on
Rate Base of \$26,198,365—
Zone Fare Opposed

Under the order of the Railroad Commission of California issued on June 1 the 5-cent fare is continued for Los Angeles. The "nickel" fare, however, is not for the casual rider. It is only for purchasers of ten rides. As indicated in the *ELECTRIC RAILWAY JOURNAL* for June 4, page 1058, the fare on the Los Angeles Railway will be 6 cents for those who do not buy "tokens" or tickets. Tokens or tickets are transferable. They are to be sold on the cars and at the company's offices.

\$2,600,000 FOR BETTERMENTS

The service improvements contemplated by the commission require the purchase by the company of 132 additional cars to cost \$1,400,000, construction of additional carhouses, shops and substations, and the making of other improvements to cost \$2,600,000.

The company is ordered to establish a depreciation fund and \$720,000 a year in monthly installments of \$60,000 and is asked to enter into negotiations with the city of Los Angeles for the purpose of exchanging, on reasonable terms, its present limited franchises for an indeterminate re-settlement franchise covering all of the lines in operation within the city limits.

The order requires that monthly statements must be submitted by the company to the commission to show how the order of the commission has been carried out.

In discussing the zone system the commission said:

It is apparent that there is a very widespread opposition to zone fares within the present 5-cent fare limits, and it is also true that there would be serious difficulties in fare collection if a zone system were adopted. In view of the conditions existing in Los Angeles, we are inclined to believe that zoning of the city should not be undertaken without further careful study and only as a last and inevitable remedy.

As to imposing a charge for transfers the commission said:

We are satisfied such a charge would result in an unjustifiable discrimination between different users of the street railway and the discrimination would be particularly obnoxious under the peculiar conditions obtaining in Los Angeles, where a large percentage of transfer passengers are short-haul riders. There would also result from a transfer charge a discrimination between various business localities in the downtown district.

DECLINING COSTS A FACTOR

The commission declares that it is apparent that the company is not entitled to the full amount of additional revenue that would be produced by a flat increase to a 6-cent fare and that no burden should be placed on patrons unless entirely necessary and justified.

The company is allowed a return of 7.4 per cent on a rate base of \$26,198,365. On this the commission said:

In a time of declining costs and prices (having in mind the unavoidable uncertainties in estimates of this nature) it may confidently be expected that applicant will earn, under the rates suggested, and under

economical and efficient management a full measure of the contemplated fair return. With the income from the rates fixed in this decision, the applicant will be in a position, we believe, to secure the necessary capital for new equipment, betterments, and extensions, and the commission will expect the betterment program be carried out.

Change in Ticket Rate.—Reductions of the ticket fare between Broad Ripple and Indianapolis was decided on by the Indiana Public Service Commission at a conference on May 4. The present rate for tickets is six for 50 cents. Under the new order ten tickets will be sold for 75 cents. The reduction in

the ticket fare is slightly less than 1 cent on each ticket. Under the old rate one ticket cost 8½ cents, and under the new order the cost of one ticket will be 7½ cents. The cash fare of 10 cents between Broad Ripple and Indianapolis, with a 5-cent fare from Fifty-third Street, will remain unchanged under the modified order which will be issued by the commission. Notice of the change in ticket rates will be given to the public when the order is issued, officials of the commission said. The order establishing the present fares was approved by the commission on Dec. 17.

170 Applications for Bus Permits

Hearings Being Held Before Connecticut Public Service Commission to Fix Status of Bus

A new campaign for supremacy between Connecticut electric railways and jitney buses has begun with the series of hearings before the Public Utilities Commission on the petitions of bus line owners, rural and interurban, for the most part, for license to operate in competition with the electric railways. The commission has received 170 applications for such certificates from various parts of the State. Its power of regulation in this matter was conferred upon it in a law passed by the present Legislature. The issue has become clearly defined and urgent as is indicated in the statement of Lucius S. Storrs, president of the Connecticut Company, while at Putnam that "either the competitive bus service must be entirely eliminated or the trolley service discontinued."

IN ADDITION to the hearing at Putnam on May 25, sessions were held at Hartford on May 24 and at New Britain on May 27. Other hearings were scheduled as follows: Middletown on June 2 on petitions concerning bus lines between Essex and Middletown, Saybrook-Middletown and Ivoryton-Middletown; at Enfield on June 2, Thompsonville-Agawam, Mass.; at New Haven on June 2. Derby-New Haven (four lines), Derby-Ansonia (two lines); at Hartford on June 1, Waterbury-Hartford.

Richard T. Higgins and Charles C. Elwell of the commission conducted the hearing at Putnam, attended by some 150 persons. President Storrs read a statement in part as follows:

The Connecticut Company is amply able, to render a full measure of service to these communities, but it must be apparent to all that all public expenditures for transportation must come to the Connecticut Company.

Up to the present time we have been temporizing with the matter, but now that the bus is a medium of transportation upon which the communities can depend as long as those individuals that operate the buses are financially able to continue, or do not become tired of the work, it is time for the Connecticut Company frankly to state its position.

It is a matter of indifference to us as to whether or not we continue to operate the lines between Central Village and points north to Putnam, but the competitive bus service must be eliminated or the trolley service discontinued.

There is no prospect of material profits to the railway even though it is left alone in the field but the company recognizes the obligation to perform public service and is willing again to render a full measure of service if free from competition.

Eight witnesses testified as to the indispensability of the buses. General J. W. Atwood, L. H. Fuller of the local chamber of commerce and other citizens spoke in favor of the trolleys.

Thomas J. McGreevy, assistant comptroller of the Connecticut Com-

pany, said that on the lines north of Central Village the operating expenses exceeded the receipts by \$37,206 for the year ended April 30, 1921.

At the hearing in Hartford Mayor Newton C. Brainard said that the presence of large buses on the city streets was most objectionable. Consideration was being given a petition for the continuance of a jitney line between the Capital and South Manchester over a route served by the electric railway. There were prominent citizens present who said there was need of both trolley and jitney service and others were unqualifiedly in favor either of one or the other. Competition over the Manchester-Hartford line has been of the keenest.

Nathaniel J. Scott, manager of the Connecticut Company's Hartford division, presented a chart to show what service the company had been rendering prior to August, 1920, and at the present time. The reduction in service, he explained, had been due to the decrease in the number of passengers. A count of passengers on Hartford-bound cars recently showed a maximum of twenty-three and a minimum of three. The seating capacity is fifty-six.

"Trolley cars are essential but they can't accommodate the public," declared Mayor Curtis of New Britain at the hearing in that city. He said that the Connecticut Company had not furnished additional service as the demand for it arose at times in the past when there was no jitney competition. It was his opinion that the company would derive larger profits on a lower rate of fare.

In New Britain the buses are run over routes within the city in direct competition with the electric railway.

The Hartford case concerns only entrance to the city as a terminus to an interurban line.

The Aldermen of Bridgeport have gone on record as believing that the jitney buses are a public necessity and convenience in many parts of Bridgeport and that the present routes for jitney buses should be maintained. Suggestions for jitney bus regulations in Bridgeport also were outlined in a report adopted by the Aldermen.

WORK DIVIDED BY COMMISSION

Because of the large number of applications for certificates to operate jitney buses in the State, the Connecticut Public Utilities Commission has found it necessary to divide the work. During the past week Commissioner R. T. Higgins has conducted hearings in Thompsonville, C. C. Elwell in New Haven and J. W. Alsop in Middletown.

Before the entire commission on June 1 at the state Capitol petitions were considered from persons desiring to operate buses between Hartford and New Britain and Hartford and Waterbury. Residents of towns lying between these cities said that they saw no advantage in having the jitney service.

The New York, New Haven & Hartford Railroad objected to the issuing of the certificates because the jitney men in Hartford and Waterbury made their headquarters near the railway stations and thus diverted passengers away from the railroad. He also said that the railroad was running eight trains daily between the two cities and thus was furnishing adequate service. The fare on the railroad is \$1.21. The buses charge \$1.25.

The commission endeavored at a hearing in New Haven on June 2 to determine the present condition of the traffic over the various bus lines radiating from that city, more particularly the New Haven-Derby route. There are about forty cars operating on the line at present, thirteen large buses and twenty-seven touring cars. The buses run every half hour and the touring cars every ten minutes. The trolleys maintain a half hour schedule for a greater part of the day.

It was estimated that each bus earns about \$7,000 a year, which with a fare of 20 cents means a passenger traffic of approximately 35,000 persons a bus a year.

\$7,000 A YEAR EARNED PER BUS

The New Haven-Derby Bus Corporation was incorporated a few weeks ago with a capital stock of \$50,000 by nine bus owners who intend to operate ten large buses having a seating capacity of from twelve to sixteen. According to the plans of the incorporators, beginning July 15 buses will run every half hour from 6 a.m. to 12:30 p.m., every 15 minutes from 12:30 to 6 p.m. and every half hour from 6 p.m. to 12 p.m. The time between New Haven and Derby is about 25 minutes.

The owners of the touring cars oper-

ated between the cities were represented by P. J. O'Sullivan, Derby. They have already planned an association and operate about twice as many cars as the bus corporation. The touring car fare is 25 cents, or 5 cents less than on the trolley.

Attorney George D. Watrous, general counsel for the Connecticut Company, questioned all the witnesses to show that the trolley can easily accommodate all the traffic. It was found on May 31 that from Derby to New Haven beginning at 5 a.m. and ending at 11 p.m. the trolleys carried 741 and the jitneys 601 passengers. Outbound from New Haven for the same period the trolleys totalled 865 and the buses 703, showing that out of a total of 2,910 passengers the buses carried 1,304, or nearly 45 per cent. Attorney Robert J. Woodruff, in behalf of the buses, brought up the question of the increases in fare which have been made by the trolley. It was finally agreed by representatives of both the trolley and the buses to furnish financial statements for those particular lines during definite similar periods.

COMMISSION RESERVES DECISION

Commissioner Elwell, together with Mr. Wadhams and Mr. Rudd, heard the testimony. Mr. Elwell examined each of the witnesses.

On June 7 in New Haven the commission heard evidence with respect to bus service between New Haven and Wallingford.

Seventeen per Cent Wage Reduction in Youngstown

A new wage agreement has been entered into between the trainmen and the Pennsylvania-Ohio Electric Company, the Youngstown Municipal Railway and associated companies operating city and interurban lines at Youngstown, Warren and Niles, Ohio, and New Castle and Sharon, Pa. The new scale is 48 cents an hour for the first three months of employment, 51 cents an hour for the next nine months and 56 cents an hour after one year, with 5 cents additional on all classifications for operators of one-man safety cars.

This is a reduction of 12 cents an hour in each classification and of 17.6 per cent on the base rate. The old scale was 60 cents an hour for the first three months of employment, 63 cents an hour for the next nine months and 68 cents an hour after one year, with the 5-cent differential for operators of safety cars.

The old scale expired at midnight on May 31, at which time no agreement had been reached. Operations and negotiations continued and the agreement was reached on June 2 and was ratified by the trainmen by a vote of 348 to 106, about 85 per cent of the men voting. The new agreement continues in force till June 1, 1922. It provides for minor changes in working conditions and removes restrictions on the use of one-man safety cars.

On June 4 a new agreement also was

reached by the same companies with their linemen, who had been on strike since May 1. The new wage scale for these men is on the same percentage of reduction as that of the trainmen. The old scale had been on the base rate of \$1 an hour. This was reduced to 82½ cents an hour. The linemen had demanded the renewal of the old rate.

Kansas City Residents Hard to Pacify

Weekly adjustment of jitney routes by the city jitney inspector has become necessary at Kansas City, Mo., to meet objections from property owners and the constantly decreasing number of streets available for jitney use is raising a serious situation with respect to routing. It is not always possible to select a route on which jitney operation might be profitable. Citizens have prepared petitions to the Mayor, asking that jitneys be routed away from their streets; and in many cases the Mayor has responded to the petitions by ordering the routes changed. In some instances the City Council has passed ordinances requiring the changing of jitney routes.

In other cases routes have been shortened so that now they are short-haul and jitneys on such routes are finding competition with the railway difficult at the 10-cent rate. In consequence there is a prospect that jitney tickets on such routes may be sold at two for 15 cents.

The chief harassment of city officials is from home owners who point to the hazards to children of jitney operation on residence streets. Downtown the difficulty has not yet been adequately met of so routing jitneys as to avoid serious congestion of normal traffic in busy hours.

Jitneys were recently by ordinance ruled off streets on which the Kansas City Railway operates.

Would Make Operating Ordinance More Explicit

Objection on the ground that it is not sufficiently explicit was made by Mayor John Galvin of Cincinnati to an ordinance submitted by the Cincinnati (Ohio) Traction Company, providing for a decrease in fares. The principal provisions of the ordinance, which was submitted as an amendment to the present ordinance, are as follows:

That school children ten years old and over shall pay 5-cent fare.

That those less than ten years shall ride as minors on half fare.

That payment of the Cincinnati Street Railway franchise tax of \$350,000 a year be deferred for 1920 and 1921 until after Jan. 1, 1922.

The proposed ordinance also provided that when fares exceed 7½ cents the company be not required to make any payment into its reserve fund. Under the present ordinance the reserve fund must reach \$650,000 before fares can be reduced.

The city officials, after considering the ordinance, asked that it be redrawn to make it more explicit, particularly as to when fares will be reduced.

Bus Men Determined to Fight

A hearing was scheduled for June 7 in the Common Pleas Court at Toledo, Ohio, on the petition for a permanent injunction restraining the city from enforcing the bus regulatory ordinance, which was to have gone into effect on June 1. The court recently granted a temporary restraining order which permitted the buses to operate during the week. The city attorneys claim that the municipality has still the right to regulate any kind of traffic and that the buses do not own any privilege of the streets.

At a recent meeting of fifty-five bus owners and operators the bus men said they would not take out licenses and provide indemnity bonds but would stand arrest and prosecution.

Commissioner W. E. Cann, when the measure was proposed in Council, pointed out that the Community Traction Company pays approximately \$300 a car annually in taxes, street cleaning, snow sweeping, pavement repairs, and other ways, for the privilege of operating. Buses, heretofore, have been charged a license fee of \$1 merely for police regulation.

Stage Rules Laid Down

At the hearing held at Olympia, Wash., recently on the tentative set of rules and regulations laid down by the auto transportation section of the Department of Public Works, a number of new provisions was set down for the regulation of stage and auto freight lines. The most important ruling made was the announcement that the department would hold that taxi and jitney companies could not carry passengers over lines for which certificates of convenience and necessity had been issued to stage companies. Representatives of the Seattle Taxi Company immediately announced that this was undoubtedly a point to be settled in court.

Considerable objection was raised to one clause in the rule regarding the use of emergency cars, and this brought out the fact that no car will be allowed to operate on any of the stage lines of the State unless they protect passengers by the bonding of the car with a surety company. This provision will also apply to emergency cars. At first the ruling was so drawn that before an emergency car could be placed on a run, it would be necessary to telegraph the department at Olympia and get permission of the head of the stage department there. This, however, was amended so that a record will be kept of the use of emergency cars, and a fee charged therefor, but only bonded cars will be used.

Ten hours of driving was decided upon as the maximum length of time in which a stage driver should work in any twenty-four hours, and eight hours of consecutive sleep was determined on as necessary in every twenty-four hours to keep him fit properly to protect the public. The new rules became effective on June 1.

Transportation News Notes

Seven Cents in Sioux City.—The Sioux City (Ia.) Service Company was recently granted permission to charge a 7-cent fare under a temporary injunction which restrains the city from enforcing the ordinance providing for a 6-cent fare. Refund certificates good for 1 cent each are being issued in case final judgment is against a 7-cent fare. The City Council recently stated its unwillingness to countenance any wage cut affecting employees. The company accordingly brought court action.

Fare Suit Dismissed.—The suit of Reuben Ruthenberg, attorney, to enjoin the Louisville (Ky.) Railway from collecting more than 5 cents was dismissed by Judge Kirby recently because the same questions involved in Attorney Ruthenberg's suit are pending in the United States Circuit Court of Appeals. It was Attorney Ruthenberg's plea that he acted in the capacity of a private citizen, while in the other suit the municipality was concerned. Judge Kirby indicated that it was the rule in Kentucky that the court taking first jurisdiction in a case should carry it to a conclusion.

Fare Rate Excessive.—Examiner Witters recently filed a report with the Interstate Commerce Commission maintaining that the 10-cent fare charged by the Louisville & Northern Railway & Lighting Company, New Albany, Ind., was unreasonable. The line runs between Louisville and New Albany and up to Oct. 31, 1920, operated on a 7-cent fare. Shortly after the inception of the 10-cent rate the city of New Albany, the Chamber of Commerce and several associations filed a protest with the Interstate Commerce Commission asking for a hearing. This hearing took place on Feb. 17 of this year before Mr. Witters.

Rehearing in Fares Refused.—The Board of City Commissioners of Dallas, Tex., has refused the application of the Dallas Railway for a rehearing of its petition for authority to increase fares from 6 cents to 7 cents in Dallas. The refusal to grant the 7-cent fare was based on a report by J. W. Everman, supervisor of public utilities, in which it was shown that the earnings of the Dallas Railway during April showed a net return of 7.275 per cent on its invested capital, while the franchise provisions call for a net return of 7 per cent. It is also claimed that, eliminating the earnings of the Dallas Interurban Building, which is 4 per cent, the Dallas Railway would show net earnings of 78.93 per cent during April. The action of the application for rehearing had been delayed because of the death of J. F. Strickland, president

of the company. The 6-cent fare granted the company for a period of one year will expire on June 25, and the city commission has made no intimation as to whether this fare will be continued for another year. It is believed, however, that such an extension will be granted. Action on the matter of resort to the Federal court will likely await the election of a successor to Mr. Strickland.

Fare Increase Authorized.—Determining that the Salem & Pennsgrove Traction Company, Pennsgrove, N. J., under its present operating revenue, will not be able to meet the interest on its funded debt or even the taxes which will become due, the Public Utilities Commission has allowed the company to increase from 7 to 8 cents the rate of fare in each of its five zones. The company's line extends from a point in the Borough of Pennsgrove through the townships of Upper Penns Neck and Lower Penns Neck, in Salem County, a distance of 14.25 miles. The company was formed and the road constructed in 1915 entirely with private capital. When it was constructed there was in operation a large industrial plant at Carney's Point for the manufacture of war munitions and the road was required for the transportation of employees. During 1916 and 1917 the road was operated at a profit on a 5-cent fare, but in February of last year the commission permitted the company to charge 7 cents. Since the cessation of the war the industrial plant laid off hundreds of hands and the road lost money. Residents of the communities using the railway favor the continuance of operations and no objection is expected to the increased rate.

Saltair Road Raises Fare.—The Salt Lake, Garfield and Western Railroad, Salt Lake City, Utah, has been granted permission to increase its one-way fare from Saltair beach to Salt Lake City, in a recent decision of the Public Utilities Commission of Utah. The decision grants permission to increase the one-way fares during the Saltair beach resort season from 25 to 35 cents and the one-way half fare excursion from Saltair to Salt Lake from 15 cents to 20 cents. The decision particularly affects motorists who go to the resort by auto and return on the train. When the round trip fare was increased to 35 cents last year a subfare was published providing for a 25-cent excursion fare from the beach to Salt Lake. The decision now makes the one-way fare the same as that charged for the round trip from the city. The company claimed that it had sustained a loss from operating the road between the beach and the city during 1920 which amounted to \$37,000. The increase granted, it is estimated, will increase the revenues by \$6,000 during this year, but the company will sustain a deficit, according to testimony given before the commission. The increase will be made effective on ten days' notice filed with the commission. The commutation tickets at present are sold in books of thirty for \$7.50 and books of 100 for \$20.

Personal Mention

Mr. Beall Texas Electric Railway's New Head

Jack Beall was elected president Texas Electric Railway by directors on June 7. Mr. Beall, who has been one of the attorneys for the interurban for six years, is a brother-in-law of the late Col. J. F. Strickland, former head of the railway. N. A. McMillan, St. Louis, was elected chairman of the board of directors, a position which has just been created.

Operators Advanced to Take Charge of New Department

W. R. Alberger, vice-president and general manager of the San Francisco-Oakland Terminal Railways, Oakland, Cal., has announced several important changes in the duties and responsibilities of various members of his official staff.

George H. Harris, for the past seven years general superintendent of the company, has been appointed assistant to the general manager. The position of general superintendent is abolished. A portrait of Mr. Harris and an outline of his career appeared in the JOURNAL for March 19 following his election as president of the Pacific Railway Club.

In line with the company's policy of keeping abreast or even ahead of modern business methods a new department has been created, the duties of which will be to make an intensive study of all costs and results obtained from various methods of maintenance and operation. This department, which is a decided innovation in public utility management, will secure and compile into comprehensive and graphic reports, definite and conclusive data regarding all activities of the company, not only as to costs of different types of constructions and equipment and their maintenance and operation, but also as to revenues derived from all sources. Such information will serve as a guide to the management in its efforts to furnish to the public proper and efficient service.

S. H. Pickard is appointed manager to head this newly created department, while J. W. Brom, for several years a member of the general manager's office staff, will be associated with Mr. Pickard in the new organization.

F. R. Lloyd has been appointed purchasing agent, the position left vacant by Mr. Pickard's promotion. Mr. Lloyd has been assistant purchasing agent since 1914, with the exception of two years when he served in the army in France during the recent war.

A department of personnel has also been organized to handle all employment for the company and to supervise

all training of employees, as well as all personnel work which may be undertaken. John S. Mills, formerly claim agent and assistant superintendent, is at the head of this work.

New Post for Mr. Weber

Former Power and Equipment Engineer Takes Mr. Grauten's Place on Kansas City Railways

The appointment of R. L. Weber as electrical engineer of the Kansas City Railways, succeeding S. H. Grauten, has been announced by the receivers. Mr. Weber came to the railways company in 1914, as engineer of equipment and power for the Board of Control, the bi-partisan supervisory board created by the new railways' franchise of 1914.

During the war, Mr. Weber served in the cruiser and transport force of the



R. L. WEBER

Atlantic fleet with duty on the transports *St. Paul* and *Lenape* and on the cruiser *Albany*. On his relief from service in May, 1919, he resumed his connection with the Board of Control, in Kansas City.

Prior to the war Mr. Weber had directed the design and construction of the last two series of double-truck cars which have established an especially satisfactory record. Since the war, the activities of his department have been centered on power house improvements, and under his direction several effective measures have been carried out.

Mr. Weber's change from engineer of the Board of Control to electrical engineer of the Kansas City Railways is, in a measure, incident to the realignment of departments under the receivership.

With his other duties, Mr. Weber has for some years handled the technical features of power negotiations and cases before the Public Service Commission, and his intimate connection

with these matters and the importance of power negotiations, pending and anticipated, are stated to have influenced the new appointment.

Mr. Weber is a graduate of Cornell University in the class of 1905. He is a member of the national electrical, mechanical and naval engineering societies. Before coming to the railways company, he had an extensive experience in the power field, where for several years he acted in responsible capacities on the design and construction of steam and hydro-electric properties. His electric railway experience includes connections with the Lehigh Valley Transit Company, the Kansas City, Clay County & St. Joseph Railway, and the Ironwood & Bessemer Railway & Light Company.

Mr. Cady Goes to Utica as Claim Agent

Herbert E. Cady, who succeeds Joseph S. Kubu as claim agent for the New York State Railways at Utica, began his railway duties in 1903 as a conductor on the Syracuse city lines. After a few years as a conductor, part of which time he was employed on the Syracuse-Utica third-rail line, he was appointed to the claim department force as an investigator.

He served as an investigator from 1907 until last year, when he was made assistant to Ansel D. Brown, claim agent for the Syracuse branch of the New York State Railways. He was appointed to succeed Mr. Kubu on May 16, much to the delight of his many friends.

Mr. Cady is a native of Chicago, but at an early age moved to Geneva, N. Y.

Frank L. Smith, Dwight, Ill., took office on April 11 as chairman of the Illinois Public Utilities Commission. At the same time he announced the appointment of William H. Culver, a former Chicago newspaper man, as his secretary. Mr. Smith was the unsuccessful rival of William B. McKinley, president of the Illinois Traction System, in the election for United States Senator last fall.

B. J. Yungbluth, supervisor purchasing and supplies, Philadelphia Rapid Transit Company during the absence of G. A. DuCasse, who was temporarily assigned to other duties, on June 1 resumed his duties as a member of the co-ordinating staff. G. A. DuCasse, temporarily assigned to the staff of the vice-president of accounting and finance, has resumed his former duties as supervisor purchasing and supplies.

E. W. Lewis has resigned as assistant general manager of the Iowa Railway & Light Company, Cedar Rapids, Ia., and has entered the business field for himself, forming the firm of E. W. Lewis & Company, wholesalers of electrical supplies. He became connected with the Iowa Railway & Light Company as superintendent of transmission lines, and he also held other positions

with that company before becoming assistant general manager, the office he has just resigned. He was formerly with the Westinghouse Electric & Manufacturing Company, first in East Pittsburgh, Pa., and later in Baltimore, Md.

C. C. Chappelle, who has been representing the eastern security holders of the New Orleans Railway & Light Company, New Orleans, La., in the negotiations with the city looking toward a settlement of the problems confronting the company, is well known in electric railway circles. He was at one time one of the three members of the executive committee of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo. From 1911 until 1914 he was vice-president and general manager of the Federal Light & Traction Company, New York. Previous to this and immediately after his graduation from Purdue University in 1895 most of Mr. Chappelle's associations were with the Westinghouse interests.

Lewis B. Stillwell, consulting engineer, has attained additional distinction. He has just been named a member of the board composed of six engineers to study the country's transportation systems and to suggest ways for bettering the earning power of the railroads. His associates on the board will be John F. Stevens, Col. F. A. Molitor, J. F. Wallace, W. L. Darling and W. W. Colpitts. The board will be known as the "Board of Economics and Engineering." The members will act in the interest of the National Association of Owners of Railroad Securities. Every one of the appointees is an expert railroad man of long experience and national reputation, and the selection of Mr. Stillwell as a member of this company is a tribute to him personally and to the electrical industry, with which his entire career has been associated.

L. H. McCray has been appointed assistant to C. A. Hall, general manager of the Eastern Pennsylvania Railway, Pottsville, Pa. Mr. McCray was formerly assistant manager of the New England District of the Emergency Fleet Corporation, a position he accepted after his resignation as general manager of the Atlantic Shore Railway, Sanford, Me. Mr. McCray began his railway work with the Winnebago Traction Company, Oshkosh, Wis., which he served in various capacities from 1904 to 1907, when he resigned as assistant foreman of the transportation department of the company to become superintendent of the Sterling, Dixon & Eastern Railway, Sterling, Ill. He continued with this company until March, 1908, when he resigned to accept the position of trainmaster and assistant general manager of the Atlantic Shore Line Railway. Later he was promoted to the superintendency of this road and in 1911 was elected general manager of the Atlantic Shore Railway, Kennebunkport, Me., which had succeeded the Atlantic Shore Line Railway.

Obituary

Dr. Edward B. Rosa

Dr. Edward Bennett Rosa, chief physicist of the United States Bureau of Standards, died suddenly in his office on May 17.

Dr. Rosa did very notable work in the scientific field and particularly in electrical research. As a pure physicist alone he by his accomplishments and studies won for himself a place of honor among foremost scientists of the day. Moreover, he was an executive, guiding carefully and intelligently the work of more than 100 technical assistants in the electrical division of the bureau, the department which had been built up and enlarged by him. The details of what is known now as the National Electric Safety Code were worked out in the bureau's electrical division under his supervision.

Some of the scientific work includes the redetermination of the ratio of the units of electrical measurement, the measurement of the electrochemical equivalent of silver, the invention of new methods for measuring capacity and inductance, calculations of electrical characteristics of coils, specifications of the international candle, and electrolysis research. In connection with the last-named study he has made investigations in a great many cities and proposed methods of mitigating electrolysis caused by stray railway currents.

Dr. Rosa was born in Rogersville, N. Y., in 1861, and was graduated from Wesleyan University, Middletown, Conn., in 1886. Five years later he received his doctor's degree from Johns Hopkins University. He returned to Wesleyan as a professor of physics, where he invented a number of measuring instruments, besides conducting important investigations in electrical measurement.

In 1901 he joined the Bureau of Standards as a physicist. He was a Fellow of the American Institute of Electrical Engineers, a former director of the Illuminating Engineering Society, and one of the most active members of the American Engineering Standards Committee.

Henry W. Beebe

Henry W. Beebe, supervisor of equipment of the Connecticut Company, New Haven, Conn., died on May 19. Mr. Beebe had been in poor health for about two years but had been on the job till the end, his final illness lasting about one month.

Mr. Beebe had been in the electric railway business from its start. He was a machinist by trade, starting as an apprentice with the New Haven Clock Company. He was later with the Ansonia Electric Company, manufacturers of telegraph instruments and

other electrical appliances. In December, 1893, when the old Fair Haven and Westville Railroad started to electrify, he entered the shops of this company as a machinist, later becoming the general foreman of the road. This position corresponds to that of master mechanic today. When the consolidation was effected which resulted in the Connecticut Company, he became the master mechanic of the New Haven Division. On Oct. 1, 1915, he was made supervisor of equipment of the entire system.

He was a mechanical genius in things having to do with railway rolling stock and was an expert consultant, in which capacity he acted, principally, during the last two or three years. He was sixty-four years old when he died.

William M. Grote, prominently identified with the building of the interurban lines in the Spot River Valley of Illinois, died on May 15 at the age of seventy-one. These lines, 40 miles west of Chicago, have since become a part of the Aurora, Elgin & Chicago Railroad, Aurora, Ill. Mr. Grote had resided in Elgin, Ill., for the greater part of his life and had been for many years the leader in the business activities of that community. At the time of his death he was connected in an official capacity with several banks and business enterprises.

Theron R. Hull, superintendent of the Connecticut Company, New Haven, Conn., until his retirement from active pursuits some years ago, died on May 2 in his seventy-eighth year. His initial street transportation experience dated back to horse-car days. He was superintendent of the Shelton Avenue car line in New Haven and when the Winchester Street Railway absorbed this line Mr. Hull became superintendent of the system. With the advent of the electric car he remained in the service as superintendent after the Connecticut Company, then known as the Consolidated Company, took over all the rails and equipment of the other railway properties then operating in New Haven.

Karl G. Roebling, active head of John A. Roebling's Sons Company, died of apoplexy on May 29. He had been president since October, 1918, when he succeeded his uncle, the late Charles G. Roebling. Mr. Roebling was born July 7, 1873. He prepared for college at Lawrenceville and was graduated from Princeton in 1894. Upon the completion of his schooling he worked at the Roebling mill and was shifted from one department to another until he had become familiar with all phases of the work. The Roebling company has been brought into international fame by the building of the Brooklyn and Williamsburg bridges, the suspension type of construction having been installed by John A. Roebling, the founder of the business. Col. Washington A. Roebling, who has been elected president of the company to succeed his nephew, was the engineer in charge of the bridge construction.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Railway Material Prices in February, 1921 and 1919

Several Products Now Cost Less Than Two Years Ago—Average Price Shows 8 per Cent Increase

From time to time tables have appeared in these columns showing the comparative increase in peak prices of railway material over the pre-war level. Since the downward movement of commodities set in, however, data showing just how great the recession has been in the electric railway field has been incomplete. In this connection one of the large Canadian traction companies has compiled figures which are appended below, comparing prices of material purchased by it in February, 1921, and in 1919. The comparison is made on the basis of actual purchase cost. At the same time the percentage of price increase on these products in 1919 compared with pre-war prices is presented. From the two columns of figures a fair idea of where present-day prices stand can be gained, though it must be recalled that the market represented in most instances is Canada and not this country.

The list presents the latest figures available on any considerable number of items purchased recently, but of course during the three months since February prices in a number of lines have receded still further. The greatest re-

cession over the 1919 cost is shown in trolley wire, with nearly 39 per cent, while linseed oil is a close second with about 36 per cent. White lead, rattan, carriage and machine bolts, dry batteries and cedar poles also show considerable decreases in cost. The price of coal it appears, represents a greater increase since 1919 than any other

material listed, with about a 50 per cent increase for both hard and soft coal. Lubricating oil, track bolts, cement, headlights, sand, certain armature coils, brakeshoes and pinions follow next in the order named. The average cost of all the materials given below covering the two-year period past shows an increase of 7.77 per cent.

Car Wheel Production Lowest in Years

Steam and Electric Road Buying Is at Minimum—Deliveries Are Prompt as Stocks of Raw and of Finished Material Are Fairly Good

A survey of the market among producers of chilled iron and rolled steel car wheels reveals virtually a uniform condition of light demand. Both steam and electric lines are buying the smallest number of wheels possible to meet their requirements, inquiries are scattered, and there are no large orders being placed. A representative producer normally turning out more than 1,000 chilled iron wheels daily reports that except for one or two steam roads there has been practically no business placed for the past six months.

An idea of the extent to which roads throughout the country are stocking wheels can be gained from the business of another manufacturer who is receiving orders for twenty to fifty wheels at one time at present, where the same orders formerly totaled 1,000 to 2,000 wheels. An optimistic note is sounded by a leading producer of rolled steel wheels, however, in reporting that the wheel tonnage holds up much better than other steel products, and that considering the present readjustment period through which we are passing, business is as large as could be expected.

Production, in view of the volume of buying, is down to low levels. Operation in extreme instances is nil, and some wheel manufacturers produce only when they accumulate sufficient orders to run plants for three or four days. Still others report a production as high as 40 to 60 per cent of capacity, but the general operating scale, it seems, is lower than it has been for many years. No trouble is experienced in making quick shipments, especially as competition is very keen at the present time. Foreign producers are making their influence felt too, as evidenced by a recent South American order for 10,000 steel wheels which was carried off by a German company in competition with British and American firms.

Stocks of raw and of finished material differ rather widely as some manufacturers in reducing their inventories

carry only sufficient raw material to cover current orders and either no finished wheels at all or only enough to comply with contracts. For the most part, however, raw material stocks in this field are good, with here and there a producer who is overstocked. The same applies to the finished product, as some producers still have wheels carried over from the rush period of last year, but in general only a fair quantity are on hand.

The majority of producers, it seems, remain silent on the question of prices, but one of the leading manufacturers of chilled iron wheels is responsible for the statement that quotations are about 25 per cent below the peak and that future price developments are uncertain. Another view states that big price reductions cannot be made until plants are operated on a normal basis again. Nearly all wheel companies have reduced wages, though here and there one reports undiminished labor cost. The average decrease in wages has been from about 10 to 20 per cent, with an extreme of 25 per cent.

The industry appears to be about evenly divided over the business outlook in the car wheel market. Some producers see little or no prospect of any improvement in conditions this year, while others are optimistic in tone. This optimism is apparently based on the realization of lower railway labor costs and the expectation of freight rate reductions, which it is thought would encourage a gradual return of general business.

Electrification of Philippine Railroad

According to the *Bulletin of Government Commercial Agency in New York*, the Manila Railroad Company plans to develop the water power of the Agno River in central Luzon to supply electricity to operate the railroad. It is estimated that from 12,000 hp. to 15,000 hp. can be developed.

PERCENTAGE OF INCREASE

Material	Unit	1919 Over 1913	1921 Over 1919
Bases, trolley	Each	113.1	3.73
Batteries, dry	Each	105.0	e 10.56
Bell cord, No. 9	Lb.	140.0	1.19
Bell cord, No. 7	Lb.	143.0	0.00
Bolts, carriage, 4x1-in.	100	146.8	6.02
Bolts, machine, 6x1-in.	100	135.5	14.96
Bolts, track, 31x1-in.	100 lb.	75.0	27.85
Brake shoes	Each	180.6	24.75
Bricks, fire	1,000	100.3	* 6.24
Brake hangers	Each	97.9	11.70
Coal, anthracite	Net ton	65.2	49.55
Coal, steam	Net ton	132.4	51.35
Coils, armature, 12A	Set	61.6	* 24.93
Coils, armature, 01B2	Set	92.2	* 6.76
Commutators, 12A	Set	95.2	10.10
Copper wire (trolley)	Lb.	82.4	38.71
Cement	Bag	141.2	27.55
Gears, 12A	Each	305.3	9.38
Gear cases	Each	235.8	12.15
Grease, motor	Lb.	100.6	6.45
Grease, curve	Gal.	25.9	11.77
Headlights	Each	47.4	27.39
Fittings, malleable iron	100 lb.	117.1	20.00
Oil, ammonia	Gal.	80.5	6.35
Oil, lubricating, black	Gal.	24.1	33.33
Oil, linseed	Gal.	171.4	35.79
Pinions, 38B	Each	245.1	22.93
Poles, cedar, 45 ft.	Each	48.5	* 8.50
Poles, trolley, 12-ft.	Each	139.2	16.40
Rattan, seating	Sq. ft.	71.9	4.08
Rattan, sweeper	Lb.	244.4	29.03
Rails, 72-lb.	Gross ton	46.1	19.78
Sand	Load	140.0	25.00
Ties	Each	163.1	* 10.00
Uniforms	Each	38.5	14.57
Wheels, car, 33 in.	Each	79.6	2.85
Wheels, trolley	Each	91.0	11.52
Waste, white cotton	Lb.	105.9	5.88
White lead	Lb.	100.0	12.59

* Prices as of Dec., 1920; no material bought since this date.

e—Boldface indicates decrease.

Uneven Conditions in Car Headlight Market

Survey of Situation Among Large Producers Reveals Up and Down Volume of Demand, Stocks and Production

A survey of the manufacturing situation among virtually all the large producers in this country of car headlights used by electric railways reveals uneven conditions of demand. One of the leading manufacturers reports that the volume of business in this line is good, and a couple of others state that though buying is confined largely to replacements, demand is within 80 per cent of last year and at a higher ratio than many other equipment lines. This favorable situation, unfortunately, is not general as a number of other headlight manufacturers are finding very little new business. Some of these state that present orders cover only replacements and repair parts, while some find that new equipment, especially safety cars, accounts for most of the business that is being placed.

KEEN COMPETITION FOR ORDERS FELT AMONG PRODUCERS

It would seem, on the whole, that the headlight market is by no means brisk, as evidenced by the keen competition for orders. This is reflected in the quality of service rendered to customers, as except for one producer who quotes four to six weeks' shipment on standard headlights, virtually every company is able to make immediate shipments. In the matter of stocks of the finished product, however, some variance is shown as a few producers are carrying a normally large supply but the majority are holding their inventory at as low a point as possible. On the other hand, large stocks of raw material seem to be the rule and low stocks the exception, though this feature is constantly tending more toward normal.

Very little uniformity to production is shown. Where stocks are large it is low, as also where few orders are being received, but where headlight stocks are low and a fair volume of current orders are received, operation keeps up accordingly. This accounts for the spread between production at 10 per cent of capacity in one instance and as high as 75 per cent in another. To accomplish this curtailment working forces have been cut in several instances, on an average of 20 to 40 per cent. A number of producers have reduced wages 10 to 15 per cent, but others report that they have made no flat reductions though bonuses and similar extras have been eliminated.

PRICES DOWN 10 TO 15 PER CENT SINCE FIRST OF YEAR

Headlight prices have been reduced 10 to 15 per cent since the first of the year or the peak level, and the further tendency would seem to be still downward inasmuch as at least one producer has just made a further cut this month. The outlook for business the balance

of this year in this line is generally thought to be none too bright. A quiet market is expected to prevail, though starting with the fall there is hope that demand will gradually increase and reach normalcy again by next spring.

Increase in Trolley Wire Price Is Not General

Two Producers Advance Base Price One-Half Cent per Pound, but Copper Is Again Weak

In line with the gradual firming of the copper market over the past few weeks, at least two producers of trolley wire have increased their base prices to the extent of $\frac{1}{2}$ cent per pound. This is interesting in the light of the prevailing opinion that an increase in buying will very probably follow a stiff advance of prices.

That this increased demand has not developed, it is thought, is because the copper market does not consistently hold its gains and the advance in base prices by wire producers has not been general. Within the past two weeks spot electrolytic copper touched a high range of 13 $\frac{1}{2}$ cents per pound, but it has since receded and can now be bought for 13 $\frac{1}{2}$ cents.

At the present time, though base prices are quoted, they do not represent an absolute indication of prices for the reason that the market is so strongly competitive these prices are not strictly adhered to. Among several of the leading producers base quotations range in gradations of $\frac{1}{4}$ cent per pound from 15 to 16 cents. The market remains fully as quiet as it has been over the past few months. Electric railways are showing little activity and buying is mostly for maintenance, though it is said that an increase in the number of inquiries from the West is noted. The foreign market is flat and, taken all in all, the outlook seems to point to a very quiet summer.

Producers are reconciled to this, however, and are buying copper from hand to mouth for the most part. Production is down commensurate with buying, and in a number of instances plants are operated only as orders are received. Deliveries can be made promptly and on an average range from ten days to two weeks and even better. Producers of trolley wire other than bare copper, such as composition material, report a fair stock on hand that is sufficient to care for orders immediately.

Hopes are now being pinned to the fall months, as it is generally expected that September and October will see a material increase in business in this line. The basis of this belief apparently is the tremendous unfilled need for wire in the industry that is known to be existent.

Dry Cell Prices Are Reduced

Leading manufacturers of dry cells, including "Columbia," "Eveready" and "Red Seal" makes, reduced prices last week. The drop was about 16 per cent.

Rolling Stock

Elmira Water, Light & Railroad Company, Elmira, N. Y., has received the first of the eight safety cars that were ordered from the Osgood-Bradley Company during April. Delivery of the remainder is expected to follow at the rate of two per week.

The City of Miami, Fla., which has been without street car service following the total destruction of existing storage-battery equipment by fire last fall, is erecting steel lighting poles which are also being so equipped as to carry trolley span wires ultimately. Plans leading to the actual purchase of rolling stock, however, have not yet been formulated.

Hartford & Springfield Street Railway Company, Warehouse Point, Conn., has purchased two cars from the Waterbury-Milldale Tramway Company to make up for the loss of four cars which were destroyed by fire in the company's barns a few months ago. Only two cars were bought as additional open cars are being substituted for the others that were burned. The Waterbury company is letting its cars go to replace them with one-man cars.

Franchises

Pacific Electric Railway, Los Angeles, Cal. — A franchise has been granted to the Pacific Electric Railway to construct, maintain and operate a single track on Third Street and other highways in the City of Long Beach, Cal.

Track and Roadway

Portland Railway, Light & Power Company, Portland, Ore.—Officials of the Portland Railway, Light & Power Company have consented to move the tracks on Foster Road to the center of the roadway, the work involving an expenditure of \$200,000, in order that other improvements may be made. Franklin T. Griffith, president of the company, explained that at no time had the company refused to move its tracks in accordance with the wishes of the city council; the company, however, did not wish to make the move until such time as it was certain that the improvement would be carried out. Officials of the company agreed to lay new tracks. They proposed that no pavements be laid between the tracks, and that certain important intersections be designated for hard surface. The rest of the roadbed will be built up with crushed rock and macadam, and the city officials have agreed to this plan. It will be necessary for the city to purchase the private right-of-way on which the street-car tracks are now located, the strip being 30 ft. wide and 6,000 ft. long, valued at about \$8,000.

Washington & Old Dominion Railway, Washington, D. C.—The Washington & Old Dominion Railway has received permission to construct and operate a bridge across the Potomac River at a point suitable to the interests of navigation, at or near Point of Rocks, in Frederick, Md.

Pensacola (Fla.) Electric Company.—The Pensacola Street Railway is building a spur track to the baseball park, a distance of six blocks from the Kupfrian park main line.

Montreal (Que.) Tramway.—At the present time the company has extensions in contemplation amounting to about 15 miles of track within the city limits. As it is, the requirements demand a thousand tons of rails per year to provide against wear and tear, depreciation and breakages. In all there are about 1,500 men engaged in track work alone for the tramway company, whose summer program of a \$1,500,000 expenditure gives assurance of a very considerably extended industrial activity. This \$1,500,000, it was pointed out, does not include the company's own renewals and maintenance work, but covers only work necessitated by the repaving of streets by the city, a cause which necessitated most of the work viewed by the officials in a recent inspection.

Dallas-Terrell Interurban Railway, Dallas, Tex.—Construction work will start in earnest on the Dallas-Terrell Interurban line within the next sixty days, according to Richard Meriwether, Dallas, vice-president of the company. Grading work on a two mile stretch near Mesquite is going forward, and the company expects to award the main contract for completion of the line some time before July 1. The interurban committee at Terrell reports that all deals are about closed assuring right of way through Kaufman county. The awarding of the contract will be somewhat delayed on account of the death of J. F. Strickland, president of the new company organized to build this line.

Power Houses, Shops and Buildings

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—The Terre Haute, Indianapolis & Eastern Traction Company will build a new terminal station in Terre Haute, Ind., this summer at a cost of \$200,000.

Cincinnati (Ohio) Traction Company.—The Ohio Public Utilities Commission has approved a contract made early this year between the Union Gas and Electric Company and the Cincinnati Traction Company for furnishing electrical current to the latter company.

Toledo Railways & Light Company, Toledo, Ohio.—Toledo's new interurban station was opened to the public on June 1. It is located at the corner of Superior and Jackson Streets, opposite the old station.

Professional Note

Chester M. Clark, formerly head of the corporation department of Stone & Webster, Inc., and during the war secretary of the underlying company at Hog Island, and assistant to Matthew Brush, the president of that corporation, has been elected treasurer of Arthur D. Little, Inc., Cambridge 39, Mass.

Merton R. Sumner has been appointed chief engineer of Arthur D. Little, Inc., chemists, engineers and managers, Cambridge 39, Mass. Mr. Sumner was formerly chief engineer for New England of Fred T. Ley & Company, Inc., in charge of about 135 construction projects and more recently was chief engineer of the Fuller Industrial Engineering Corporation, a subsidiary of the George A. Fuller Company.

L. E. Gould, Chicago, has announced that he is planning to broaden his field to include the study of energy measurement problems for which his engineering staff is well adapted. Thus on any property he is prepared to select the type of cars which will best fit existing operating conditions from an energy conservation standpoint; to determine the comparative energy consumption of various types of motor equipment, different gear ratios, heater and other auxiliary circuits under service conditions; to make surveys on voltage drop, line loss and general characteristics of the distribution system preliminary to a rearrangement of feeder copper, and to measure the energy consumption of interurban cars or freight motors on city or foreign track, so as to give the correct rate of billing for energy consumption.

Trade Notes

Pressed Steel Car Company, Western Steel Car & Foundry Company have recently moved their offices to the Seaboard National Bank Building, seventh floor, 55 Broad Street, New York City.

The Howard-Geeseke Company, 802 Plymouth Building, Minneapolis, Minn., has been appointed sales representative of the Condit Electrical Mfg. Company, Boston, Mass., in the states of Minnesota, North and South Dakota, and the northern peninsula of Michigan.

Colonel Washington A. Roebing has been elected president of John A. Roebing's Sons Company, wire manufacturer at Trenton, N. J., to succeed his nephew, Karl G. Roebing, who died suddenly at his summer home at Spring Lake, N. J., on May 29. Colonel Roebing is 84 years old and has long been identified with bridge construction projects, the most notable of which was the Brooklyn Bridge.

The Stoker Manufacturers' Association will convene for its summer meeting at the Red Lion Inn at Stockbridge, Mass., June 14, 15 and 16. The pro-

gram as outlined, besides taking in discussions on the handling of stoker business, publicity, advertising, etc., will take up the establishing of a research committee for certain lines of work, new uses of stokers and a discussion of the work of the recently created fuel sections of the professional section and the A. S. M. E. revision of the power test codes.

The Esterline-Angus Company is the new name of the former Esterline Company, Indianapolis, Ind. The original company was organized in 1900 by J. W. Esterline, and in 1910 D. J. Angus became associated with Mr. Esterline in a consulting engineering business. In 1917 he became a stockholder and director of the Esterline company. Two years ago these two men bought the interests of all other stockholders, and in view of their long association in both engineering and manufacturing work they have decided to change the name of the manufacturing company to that given above. There will be no change whatever in the general policy of the company, it is announced. Mr. Esterline will continue to be the executive in charge of sales promotion and advertising, and Mr. Angus will similarly direct production and engineering.

Mica Insulator Company, 68 Church Street, New York City, announces that it has won the suit brought last year against the Mica & Micanite Supplies Corporation, a subsidiary of an English concern, for infringement of the trade-mark "Micanite" which is used to identify the plaintiff's built-up mica insulation. Judge Knox of the District Court of the United States for the Southern District of New York, entered a decree ordering that the defendant corporation be enjoined from using the word "Micanite" in any way, even as a part of its corporate name.

New Advertising Literature

Bronze Products.—The American Brass Company, Waterbury, Conn., is distributing a sixty-four-page booklet covering its copper products, etc., including price lists.

Tobin Bronze.—The American Brass Company, Ansonia Branch, Ansonia, Conn., has issued a fifty-eight-page booklet describing its "Tobin bronze" and its uses, etc., with price lists.

Wire.—The Copper Clad Steel Company, Braddock P. O., Rankin, Pa., is distributing a leaflet showing loading tables and characteristics of its Aristos "Copperweld" wire.

Space Heaters.—Space heaters for commercial and domestic heating are discussed in a leaflet, 3442, just issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh.

Bus and Board Fittings.—The Erie Electrical Equipment Company, Inc., Johnstown, Pa., has issued supplementary bulletins on split porcelain insulators, wall and floor flanges and main castings for three-way and four-way pipe combinations.

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A. "A gear ratio of 12 to 52."

Q. "What brake will give me this?"

A. "The Peacock Improved 12/52."

Q. "What power will this brake develop?"

A. "That depends. Fifty pounds applied on a 10 in. handle develops a Chain tension of 1118 pounds. Or you can develop as high as 2348 pounds, applying 75 pounds on a 14 in. handle. The braking power developed depends upon the power applied to a 10 in., 12 in. or 14 in. handle."

Q. "What other features has this brake?"

A. "Like all Peacock Improved Brakes this 12/52 has the automatic stop, which prevents the chain from unwinding too far. This saves a full turn of the brake handle in applying full power to the brake shoes. Also, the eccentric is placed at the bottom of the drum, preventing the chain catching or jamming."

Q. "How will I order this brake?"

A. "Simply specify Peacock Improved Brake 12/52."

If car builders will ask us questions like this before specifying hand brakes they can be certain of securing the exact type of brake needed no matter what kind or weight of car they have in mind.

*Here it is—
note how the chain draws UP.*



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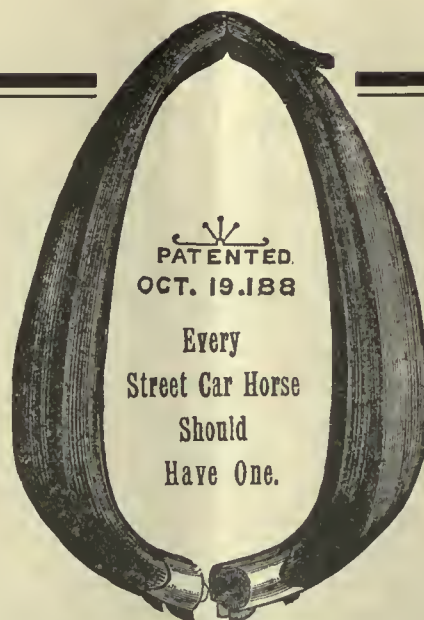
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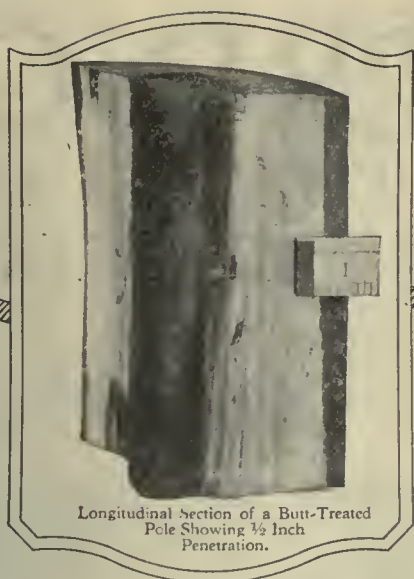
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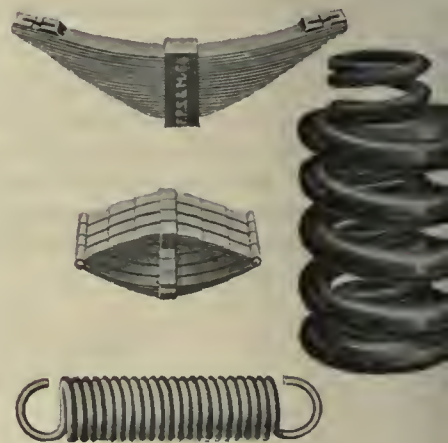
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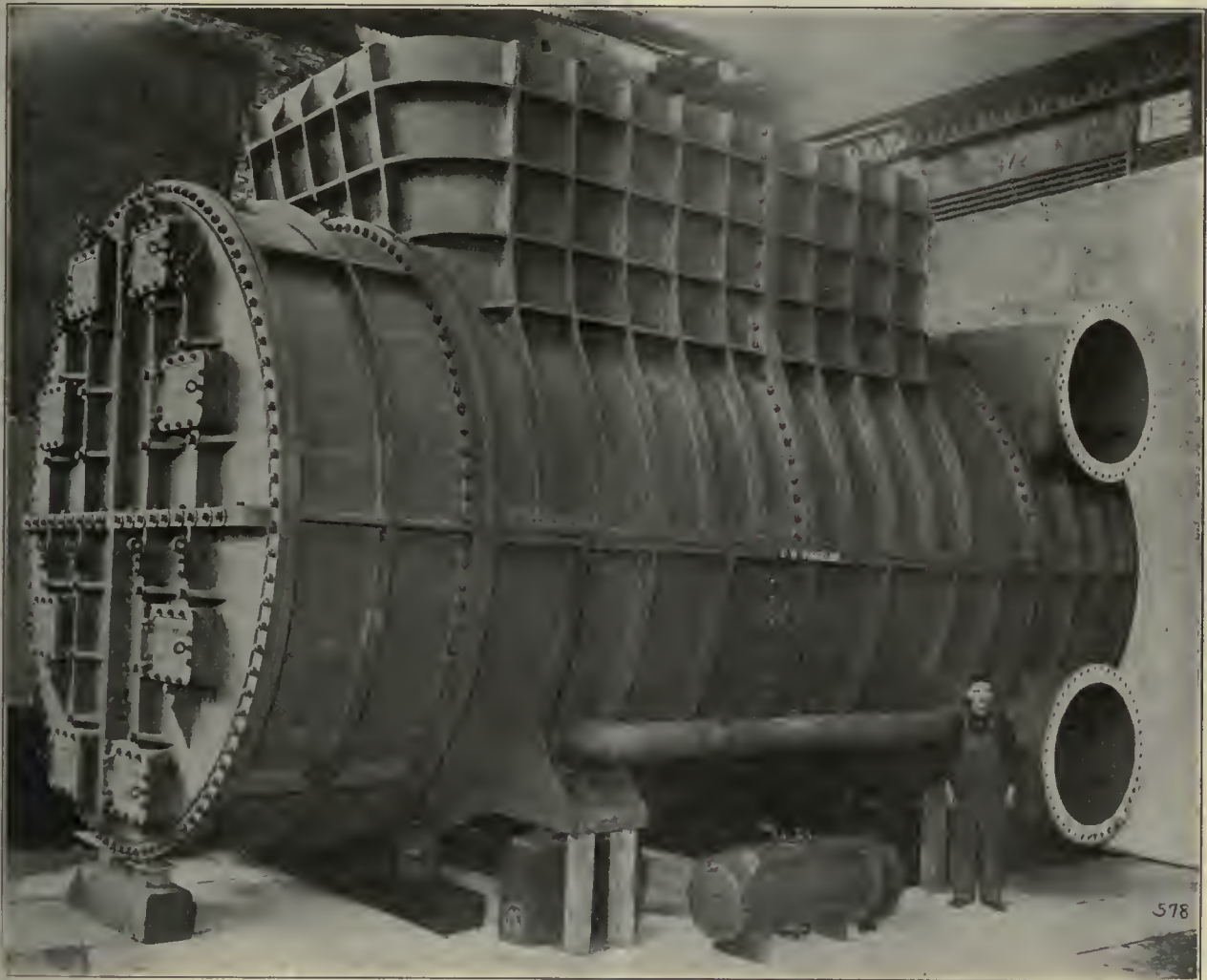


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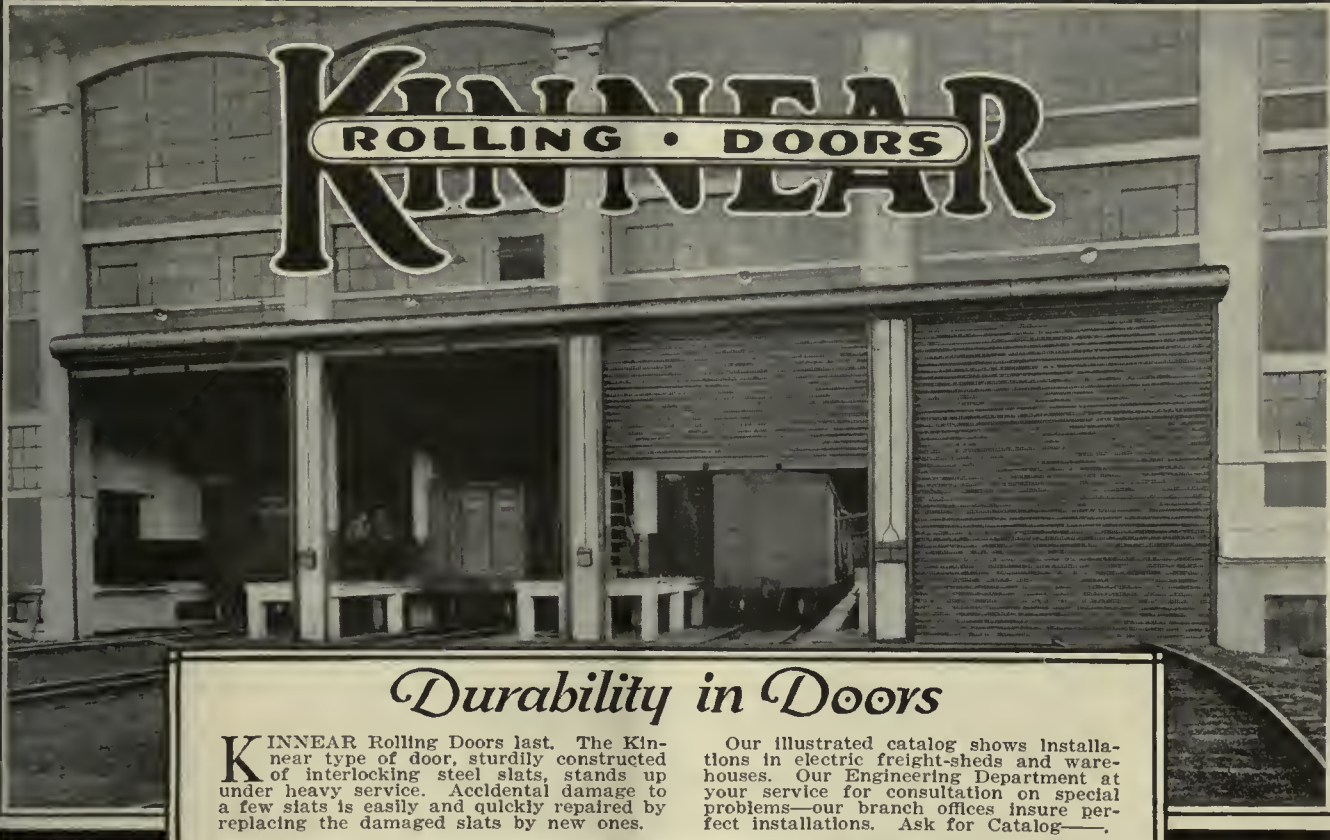
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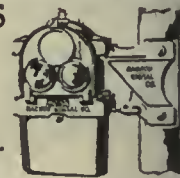
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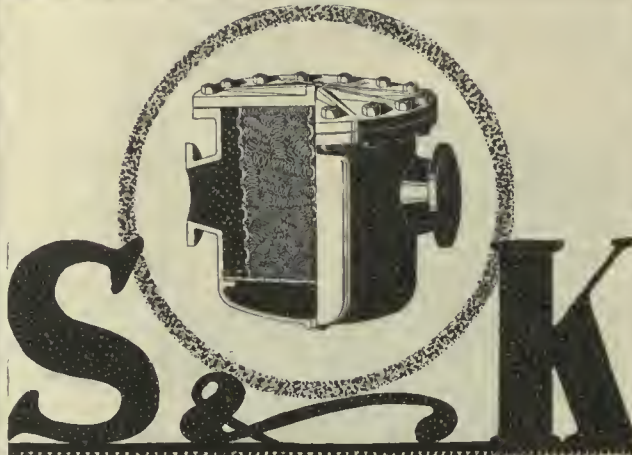
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HEEREN ENAMEL BADGES.

The International Register Co.

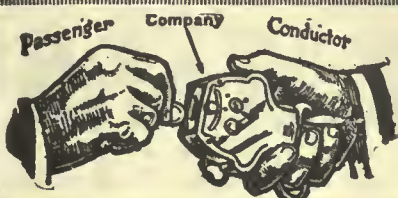
15 South Throop Street, Chicago, Illinois

WE-FU-GO AND SCAIFE

WATER

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.



Direct
Automatic
Registration
By the
Passenger

Rooke Automatic
Register Co.
Providence, R. I.

NILES-BEMENT-POND CO.

111 BROADWAY, NEW YORK

MACHINE TOOLS

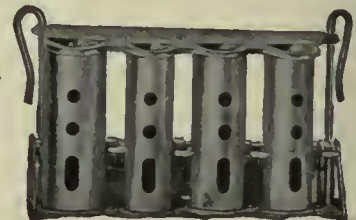
FOR ELECTRIC
RAILWAYS



Axle Lathes
Wheel Presses
Car Wheel Lathes
Boring Mills
Lathes
Hammers
Cranes
General Machine Tools

HIGH SPEED MONEY CHANGERS

The new
1921 model
—without
rivets—
ready for
delivery



Supplied
in one
or four
tube
combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them. Prices and literature sent on request.

J. L. GALEF, 75 Chambers St., New York City
Exclusive Manufacturers' Selling Agent

Let us tell you why the
CLEVELAND
is the practical fare box for the
ONE MAN CAR

The Cleveland Fare Box Company
CLEVELAND, OHIO

Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario



Use them in your terminals—
PEREY TURNSTILES
or **PASSIMETERS**

Faster than the ticket seller

Perey Manufacturing Co., Inc.
30 Church Street, New York City



Economical
in the
Long Run
BONNEY-VEHSLAGE
TOOL CO.
Newark, N. J.

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company
Carlisle, Pa.

PARK MANAGERS!!

Reduce Your Expense
A WELTE ORCHESTRION

Supplies Music that Insures Success

Use a Morning and After-
noon Attraction Without Ex-
tra Cost.

All the Great Operas and
Overtures on hand.

LATEST BROADWAY
DANCE HITS

THE BEST MADE

Will Save Their Cost in One Year.

constantly being cut.

Established 1832

\$3,000 Will Buy an Orchestrion which
Will Insure Your Music Indefinitely

An attractive proposition can be offered at this time by addressing
Mr. Terwilliger, Manager, Orchestrion Dept.

M. WELTE & SONS, INC.

667 Fifth Avenue, New York City

Manufacturers of the world famous Welte-Mignon Piano

Nelsonville Filler and Stretcher Brick for T Rails

Makes permanent, light, level pavement
with a minimum of paving repairs.

The Nelsonville Brick Co.

Columbus, Ohio

RAMAPO

Automatic Safety and Automatic Return Switch Stands for Pass-
ing Sidings. Tee Rail Special Work for Interurban Lines and
Private Rights of Way. Manganese Construction a Specialty.

Ramapo Iron Works

HILLBURN, NEW YORK

Plants at Hillburn, N.Y. and Niagara Falls, N.Y. New York Office, 30 Church Street



STUCKI
SIDE
BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

THE DIFFERENTIAL STEEL CAR CO.

H. Fort Flowers, Pres. & Gen. Mgr.

FINDLAY, OHIO

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes.

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts

Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We
carry 40 different sizes of case hardened pins in stock. Samples
furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.



They are uniform in quality

They talk for themselves

W. J. Jeandron

227 Fulton Street

New York City

Pittsburgh Office:
636 Webash Building

Canadian Distributors:
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has
Planetary Gears, Steel Parts, $3\frac{1}{2}$ to 1 factor of Safety.
It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.

Second and Diamond Sts., Philadelphia

HORNE MANUFACTURING CO.

Mercer and Colgate Streets, Jersey City, N. J.

Hand Brakes—Air Purifiers for Compressors—
Lighting Fixtures—Electric Vibrating Bells—
Thermostats—Switches, Receptacles and Plugs
—Junction Boxes, Portables and Reflectors.

Electric car heaters—thermostatic control—
pneumatic car door operators—buzzers,
single-stroke bells, starting signal lights—
special resistances.

CONSOLIDATED CAR HEATING CO.

ALBANY, NEW YORK, CHICAGO

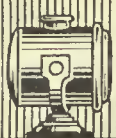
SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

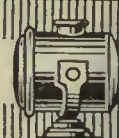
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.



Think "SEARCHLIGHT" First

ADVERTISING RATES



POSITIONS VACANT—Business Opportunities and other undisplayed ads, 8 cents a word, minimum \$2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:
1 to 3 in., \$4.50 an in. 15 to 29 in., \$3.90 an in.
4 to 7 in., \$4.30 an in. 30 to 49 in., \$3.80 an in.
8 to 14 in., \$4.10 an in. 50 to 99 in., \$3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

TIMETABLE maker, able, ambitious, experienced; state qualifications, experience and salary expected. Chicago Surface Lines, 604 Borland Bldg., Chicago.

POSITIONS WANTED

DRAUGHTSMAN experienced in street railway rolling stock work, desires change of position. Now employed. PW-889, Elec. Ry. Journal, Real Estate Trust Bldg., Phila.

ENGINEER, executive, electric railway and public service, construction, operation, maintenance; available immediately. Carl H. Fuller, 305 Elm Street, Youngstown, Ohio.

SITUATION wanted as manager of railway or gas properties, preferably in the South. Have managed one of the largest combined street railway, gas and electric properties in the South for the past three years. Can furnish best references. PW-900, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

SUPERINTENDENT, 17 years' experience in all phases of transportation, traffic and equipment in northern Ohio; very satisfactory relations with present employers; personal reasons for considering change of location; age 37, married; excellent references as to character and ability. PW-901, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

SUPERINTENDENT of transportation with nearly 18 years' experience on large city, suburban and interurban properties desires making a change in near future; successful in dealing with public and employees. I would prefer a property that requires hard work, effort and ability to bring about results. Best of references as to character and ability. PW-904, Elec. Ry. Journal, Old Colony Bldg., Chicago.

TECHNICAL man, age 35, with 14 years' practical experience, now employed as superintendent of transportation Middle West desires position in transportation, mechanical or electrical department of an Eastern property; good references. PW-907, Elec. Ry. Journal, Old Colony Bldg., Chicago.

YOUNG man desires position as time table clerk or chief clerk; six years' experience. PW-903, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

SALESMEN WANTED

Salesman

Calling on the railroad and traction lines to present a staple article of general use, state territory. AS-905, Elec. Ry. Journal.

SALESMAN AVAILABLE

SALESMAN with past experience in electric traction field, formerly master mechanic of equipment, desires change in line to represent firm calling on traction and mining trade; married man, but will accept any territory that is permanent. AS-906, Elec. Ry. Journal, Old Colony Bldg., Chicago.

FOR SALE

TRANSFORMERS

1—Type H, Form RP, Cycles 60, 200 KVA., 19100/33000Y—2300 Oil Cooled, Step Up Transformer.

1—220 Volt (B) KW., 60 Cycle, Oil Cooled, Step Up Transformer. 19100/33000Y — 2300.

4—Type HS, Form RT, Cycles 60, 135 KVA., 17100/19100/33000Y—370/370/185, Oil Cooled Step Down Transformers.

All filled with oil and in excellent shape.

UNION TRACTION CO.

Nashville, Tennessee

FOR SALE

200—G-E-67 and 80.....Motors
20—G-E-73..... (75 hp.) Motors
22—G-E-203P..... (40 hp.) Motors
4—G-E-205..... (100 hp.) Motors
16—G-E-210..... (65 hp.) Motors
4—G-E-219..... (50 hp.) Motors
22—West-101-B2... (40 hp.) Motors
2—West-506..... (25 hp.) Motors
4—West-548..... (75 hp.) Motors

TRANSIT EQUIPMENT CO.

501 Fifth Avenue, New York

Culvert and Drain Pipe

6—10 inches diameter.
Full mill lengths.

E. B. LEAF COMPANY
Real Estate Trust Bldg., Philadelphia, Pa.

FOR SALE

8 ONE-MAN STREET CARS

These are single truck cars—31 feet long—complete with motors for 650 V. operation. Hand brakes and manually operated doors. Have just been released from service in a city of 38,000 population.

A BARGAIN

Waterloo, Cedar Falls & Northern Railway
Waterloo, Iowa.

FOR SALE

Two Interurban Cars

in fine condition, one user very little as parlor car, two months in the year: Can put cross seats in this car. Cars have parlor, smoking and baggage compartment with toilet, hot water heat, GE-204 Motors, American Locomotive Trucks.

SOUTHERN NEW YORK POWER & RAILWAY CORPORATION

Hartwick, N. Y.

FOR SALE

Generating Unit

1—480-hp., 100-r.p.m., 150-lb. pressure Bates Corliss Engine direct connected to 325 kw. D.C. generator, 550-volt Westinghouse, 100-r.p.m. with panel.

Central Illinois Public Service Co.
D. R. Truax, Purchasing & Stores Agent
Mattoon, Illinois

POSITION WANTED PURCHASING AGENT

The services of a thoroughly capable purchasing agent are immediately available. He has been associated with present employers for 12 years, in full charge of material and supplies. Also has been assistant to chief engineer on construction and maintenance. He is 42 years of age, married, and can furnish excellent references as to his capability. Write

PW902—Electric Railway Journal
Tenth Avenue at 36th Street, New York

IN STOCK
for Immediate Shipment

**Turbo Units, Rotary Converters, Transformers,
Motor Generator Sets, Dynamos and Motors**

ARCHER & BALDWIN, Inc.
114-118 Liberty St., New York City
Telephone 4337-8 Rector

For 20 Years
we have been
Buying and Selling
Second-Hand Cars
Trucks and Motors
At Your Service
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE
Electric Weld
Rail Bonding Car
in A-1 Condition
C. F. PROPST
803 Harris Trust Bldg., Chicago, Ill.

"Opportunity" Advertising:

Think
"SEARCHLIGHT"
First!

0099

"SEARCHLIGHT" Want ads Talk—

They go direct to those in the industry you wish to reach and tell your story in a forceful and business-like way.

They don't mince words but get right to the point.

Use them for—

Agencies Wanted	Industrial Sites
Agents Wanted	Labor Bureaus
Auction Notices	Machine Shops
Bids Wanted	New Industries Wanted
Books and Periodicals	Partners Wanted
Buildings For Sale	Patent Attorneys
Business Opportunities	Patents For Sale
Civil Service Opportunities	Plants For Sale
Contracts to be Let	Positions Vacant
Contracts Wanted	Positions Wanted
Desk Room For Rent	Proposals
Desk Room Wanted	Property For Sale
Educational	Receivers' Sales
Employment Agencies	Representatives Wanted
Foreign Business	Salesmen Wanted
For Exchange	Specialties
For Rent	Sub-Contracts Wanted
Franchises	Water Front Property
Help Wanted	Work Wanted
Miscellaneous for Sale, for Rent or Want Ads	

For Every Business Want
"Think SEARCHLIGHT First"

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Circuit Breakers
Condit Electrical Mfg. Co.
Roller-Smith Co.

Air Reelers
Ingersoll-Rand Co.

Ammeters
Roller-Smith Co.

Anchors, Guy
Crouse-Hinds Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Cambria Steel Co.
Carnegie Steel Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Brass & Metal Co.

Babbittng Devices
Columbia M. W. & M. I. Co.

Badges and Huitons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
National Carbon Co., Inc.
Nichols-Lintern Co.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bearings, Oilless, Graphite, Bronze and Wood
Bound Brook Oil-less Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Bollers
Babcock & Wilcox Co.

Boller Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Roller-Smith Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Ry. Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes, Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Babcock Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoes & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts

Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.

Columbia M. W. & M. I. Co.
General Electric Co.
National Brakes Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Bridges and Buildings
American Bridge Co.

Brooms, Track, Steel or Rattan
American Rattan & Reed Mfg. Co.
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
National Carbon Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Graphite
National Carbon Co., Inc.

Bunkers, Coal
American Bridge Co.

Bushings, Case Hardened and Manganese

Bemis Car Truck Co.
Brill Co., The J. G.

National Metal Molding Co.

Bushings, Graphite and Wooden
Bound Brook Oil-less Bearing Co.

Cables (See Wires and Cables)

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoes & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Ackley Brake & Supply Corp.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Celling, Car
Fantasote Co.

Change Carriers
Galef, J. L.

Circuit Breakers
Cutter Co.

General Electric Co.
Roller-Smith Co.

Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables

Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)

Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coll Banding and Winding Machines
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Traction Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Conduits, Interior
National Metal Molding Co.

Conduits or Conduit Fittings
Crouse-Hinds Co.

Connectors, Solderless
Dossert & Co.
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Allison & Co., J. E.

Conveying and Hoisting Machinery

American Bridge Co.
Columbia M. W. & M. I. Co.

Copper Expansion Joints
Wheeler Mfg. Co., C. H.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebbing's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Amer. Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Cranes
Allis-Chalmers Mfg. Co.

Niles-Bement-Pond Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals (See Signals, Cross-log)

Crossings, Frog and Switch
Wharton, Jr., & Co., Wm.

Crossings, Track (See Track, Special Work)

Crushers, Rock
Allis-Chalmers Mfg. Co.

Culverts
Armco Iron Culvert & Flume Mfg. Assn.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co.
Fantasote Co.
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg. Co.

Dealers' Machinery
Archer & Baldwin
Cleveland Armature Works
Electric Equipment Co.
Foster Co., H. M.
Hyman Michaels Co.
Karaski, Friedman & Co., Inc.
Reading Engineering Co.
Transit Equip. Co.

Derailing Devices (See also Track Work)
Wharton, Jr., & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.

General Electric Co.
Hale & Kilburn Co.

Doors & Shutters, Fireproof
Kinnear Mfg. Co.

Doors, Steel Rolling
Kinnear Mfg. Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Riggng (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc., Walter A.

Electrically Operated Switches (Air or Oil)
Condit Electrical Mfg. Co.

Electrical Wires and Cables
American Electrical Works
American Steel & Wire Co.
Roebbing's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating

Allison & Co., J. R.
Archbold-Brady Co.
Arnold Co., The
Beeler, John
Clark & Co., Mgr., Corp., E. W.
Day & Zimmermann
Feustel, Robert M.
Ford, Bacon & Davis
Gould, L. E.
Hemphill & Wells
Holst, Englehardt W.
Horton, Barker & Wheeler
Jackson, Walter
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Smith & Co., C. E.
Stone & Webster
White Engineering Corp., The J. G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Exhaust Gate Valves
Wheeler Mfg. Co., C. H.

Fare Boxes
Cleveland Fare Box Co.

Economy Electric Devices Co.

Johnson Fare Box Co.

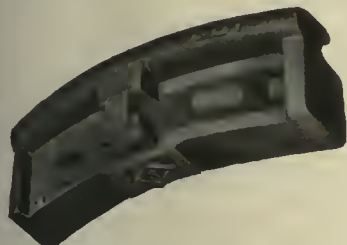
National Railway Appliance Co.

Feed Water Heating
Schutte & Koerting Co.

Brake Shoes

A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type



Standard
Patterns

for

SAFETY
CAR



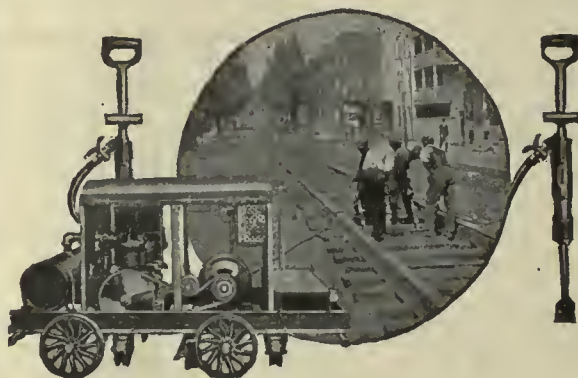
D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.

30 Church Street, New York

332 So. Michigan Ave., Chicago Chattanooga, Tenn.

Imperial Tie Tampers



2-Tool or 4-Tool Outfits
Electric or Gasoline Power

Let us send you Bulletin 9123

**INGERSOLL-RAND
COMPANY**

♦ ♦ ♦ GENERAL OFFICES, 11 BROADWAY, NEW YORK ♦ ♦ ♦

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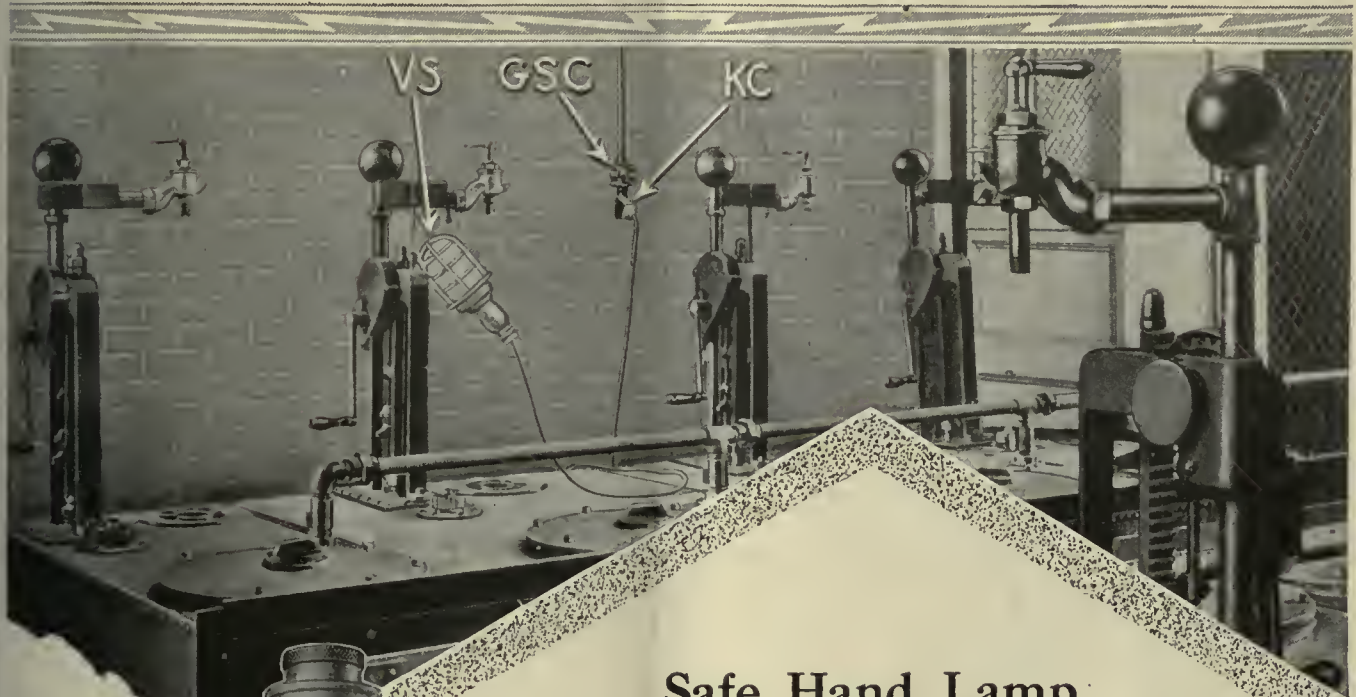


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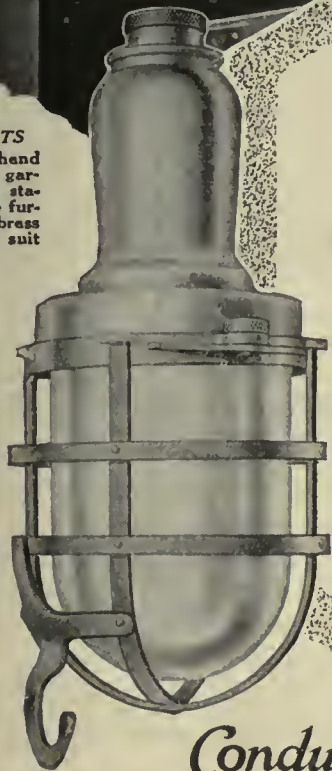
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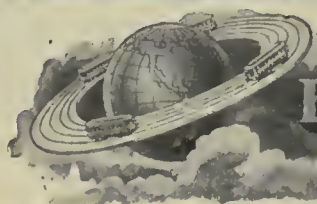
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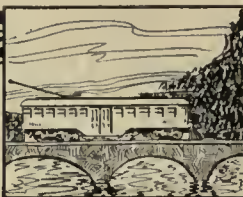
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Mounted on High-Speed Trucks Brill No. 27-MCB

On Interurban Electric Railways throughout the United States there are many types of high-speed cars constructed by the combined Brill Plants—Passenger, main passenger and smoking, passenger and baggage, main passenger, smoking and baggage, express, and many special purpose cars, all mounted on Brill High-Speed No. 27-MCB type of trucks.

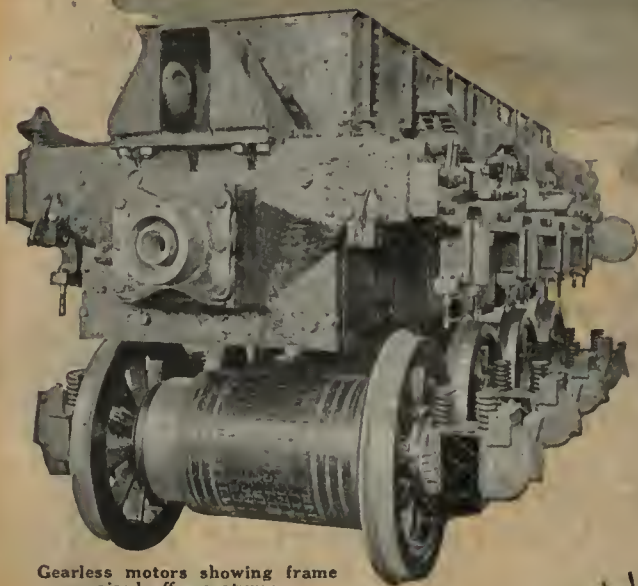
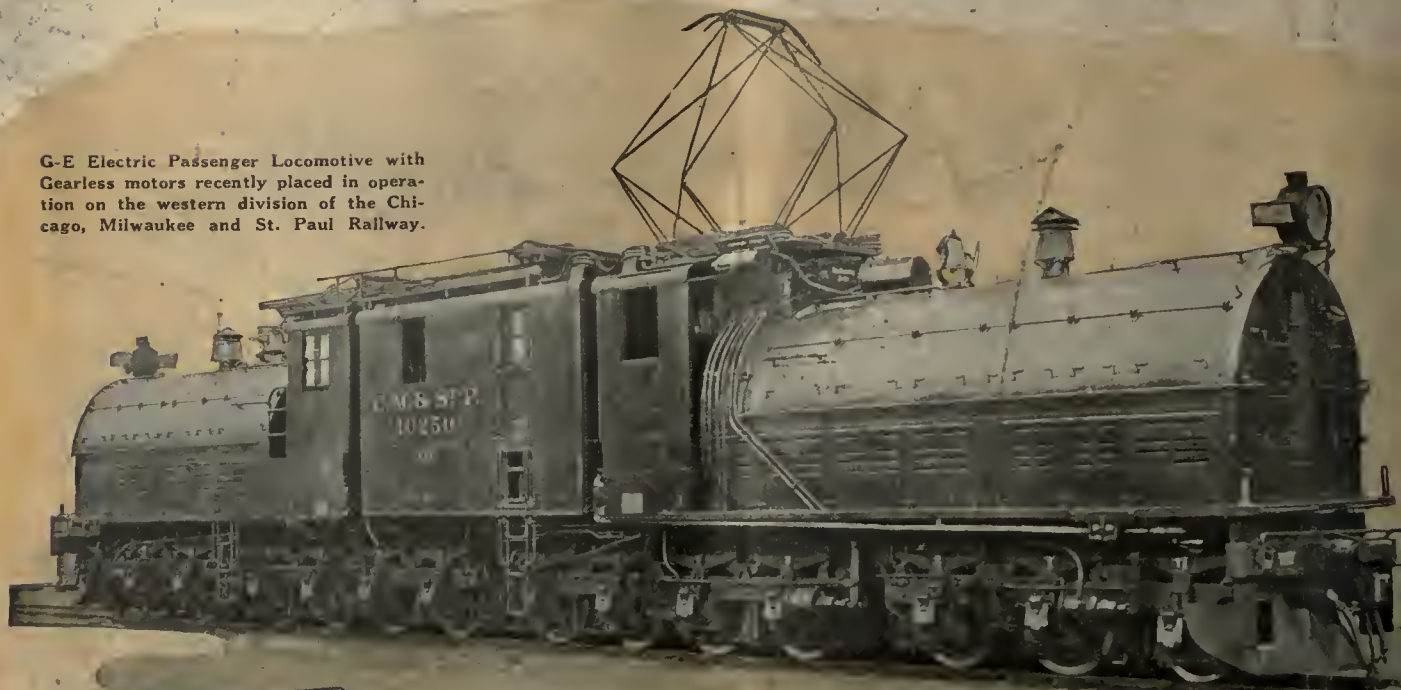
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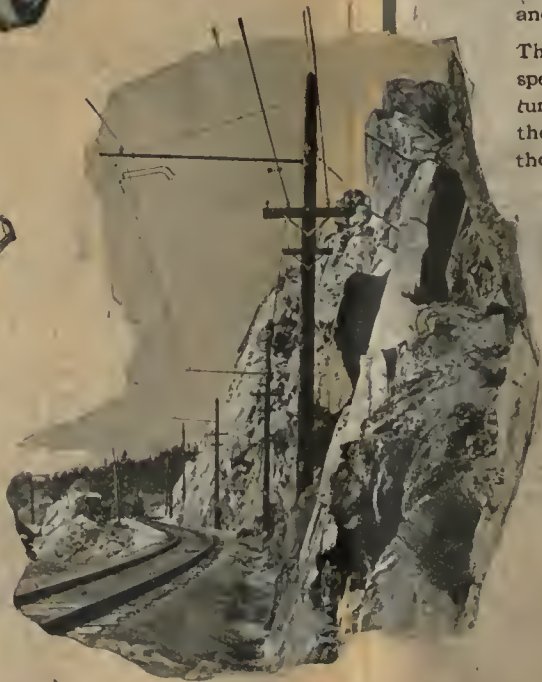


Gearless motors showing frame raised off armatures.



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G-E Line Material—Twin catenary construction on Rock Mt. Section



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Schenectady, N.Y.

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ELECTRIC RAILWAY JOURNAL



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HAS GIVEN PERFECT SATISFACTION ON THIS ROAD

More than 90%
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Don't Fail to Attend

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

Electric Railway Journal

Henry W. Blake and Harold V. Bozell, Editors

Henry H. Norris, Managing-Editor

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Shop Notes from the International Railway, Buffalo

The reclamation shop is producing attractive savings. Dipping of motor shells is a new feature. An ingenious plan for portable mounting of electric locomotive control apparatus is developed. Shop layout changes tend to facilitate maintenance practice.....Page 1114

Piston Travel and Shoe Clearance

The relation between piston travel and shoe travel is determined. With a high total leverage slight shoe wear produces a great variation in piston travel which is objectionable. Various examples which are presented by H. M. P. Murphy illustrate methods for finding the motion of levers and their proper release positions.Page 1119

N. Y. E. R. A. Holds Annual Meeting at Lake George

The one-day session was devoted to discussions on one-man car operation and taxation. Two prepared papers were presented. W. O. Wood was elected president for the ensuing year.....Page 1125

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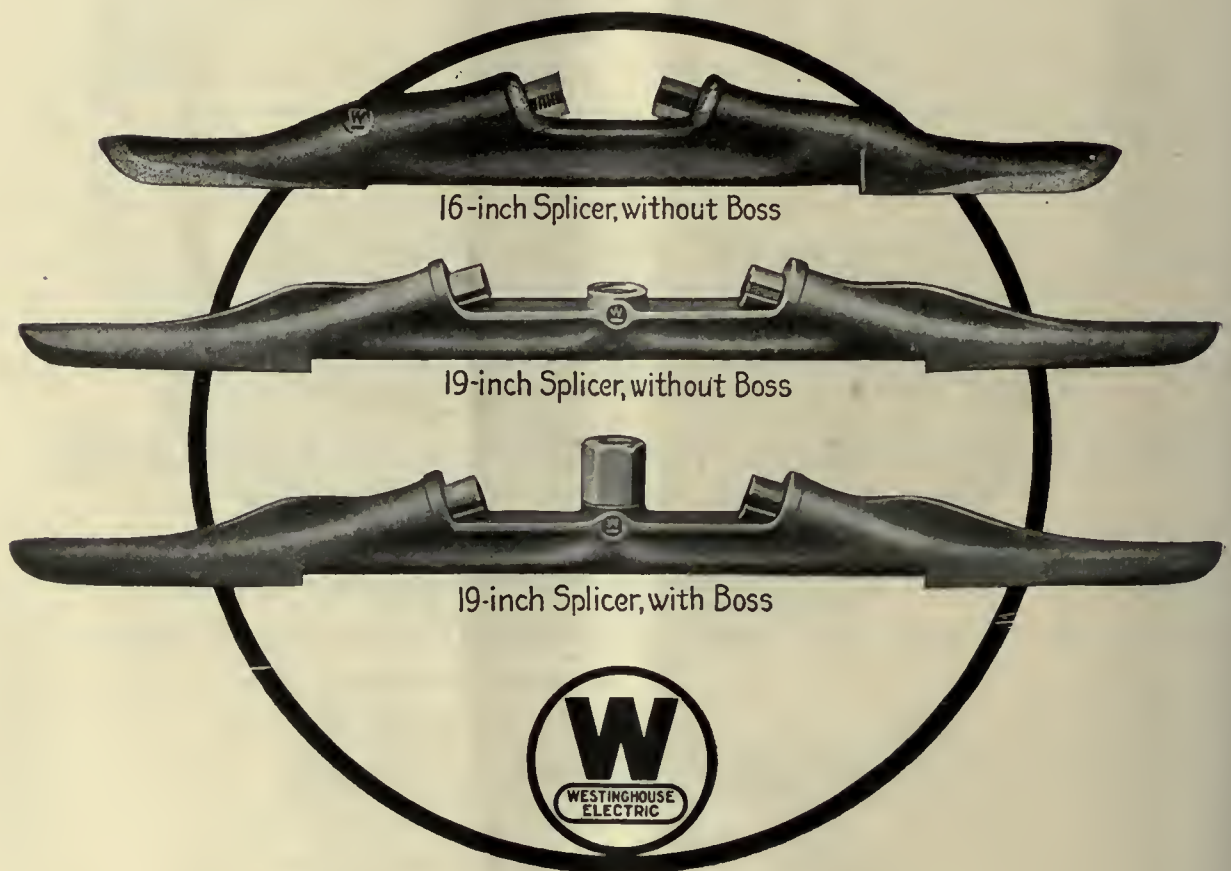
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Announcing The New Westinghouse-Cleveland Splicer with Solid Body



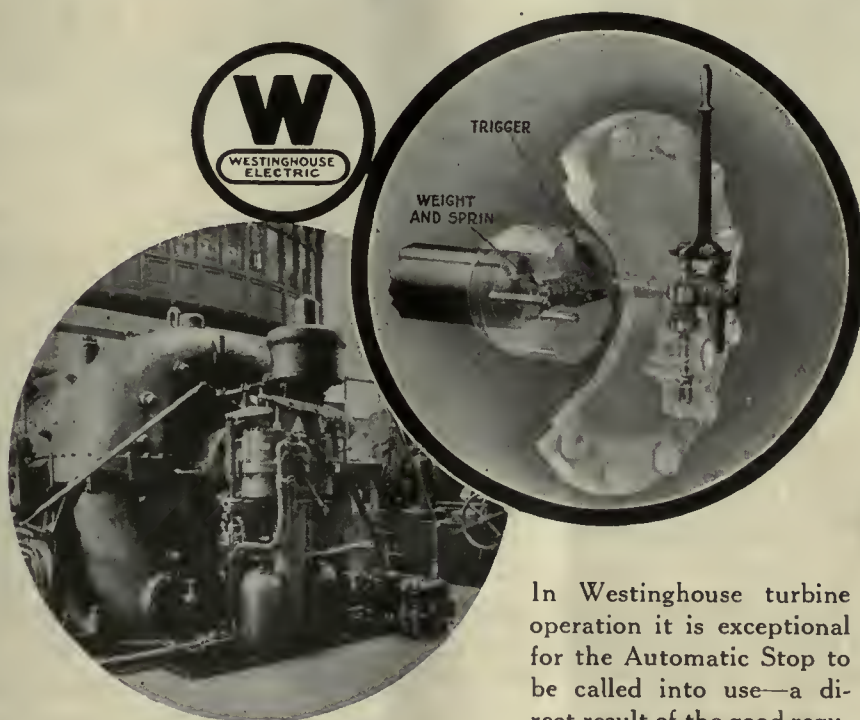
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East Pittsburgh, Pa.

Westinghouse

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In Westinghouse turbine operation it is exceptional for the Automatic Stop to be called into use—a direct result of the good regulation and the reliability

of the Westinghouse governor and governing mechanism.

The Westinghouse Automatic Safety Stop consists simply of a weight crossing the axis of the turbine shaft, held in place by a spring, and revolving in oil.

When a predetermined shaft speed is reached, the Safety Stop functions instantly. The centrifugal force of the moving weight increases more rapidly than the resistance of the spring, which allows the weight to go to the end of its travel with sufficient force to overcome any reasonable resistance.

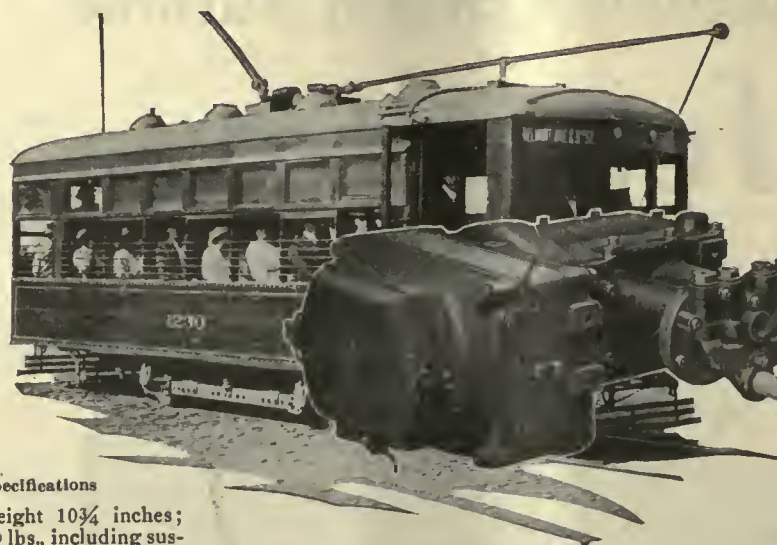
At the end of its travel, the weight releases the trigger shown below, the trigger, in turn, releasing the steam pressure from beneath the differential piston of the throttle valve, thus shutting off the steam supply to the turbine.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Sales Offices in All Large American Cities

Westinghouse

A Superior Air Compressor for the Small Car



DH-10
"Bungalow"

Specifications

Overall height 10¾ inches;
weight 420 lbs., including sus-
pension irons, brackets and
bolts; displacement 10 cu. ft.
per minute when operating
against 100 lbs. on 600 volts.

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AN INEXPENSIVE UNIT

Owing to its high-class construction and superior service, the DH-10 is recognized as an attractive investment from the financial standpoint.

It materially reduces the expense of up-keep usually attaching to the ordinary compressor; is easy to assemble, permits ready access to all working parts, requires but slight attention, possesses the highest degree of durability—these features all combining to make for extremely low maintenance cost.

The design permits continuous operation for extended periods without possibility of a dangerous rise in temperature.

Send for Publication No. 9045

Note:—The complete line of Bungalow Compressors includes three sizes of 10, 16 and 25 cubic feet displacement, the designations of these being DH-10, DH-16 and DH-25.



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An ingenious carrying system insures a constant and well-regulated distribution of oil over all the working parts. Such adverse conditions as low speed and diminished oil supply in the crank case have no effect on the efficiency of this arrangement. It is positive in every respect.

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**Any Degree of Light You Need
—Reliability Always**

On city cars you want a headlight which serves principally as a marker.

In dim suburbs and outlying districts your cars must have more light.

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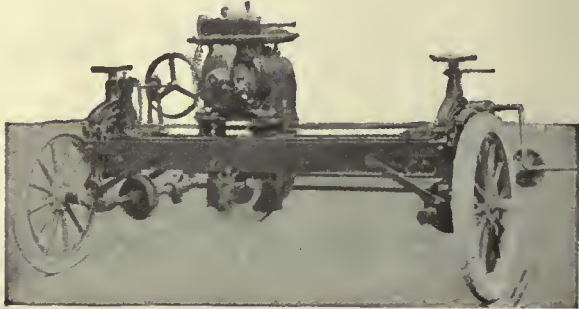
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The Universal Track Grinder has many features which facilitate and increase the accuracy of its work.

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Corrugated rails, cupped joints, battered special work can be rejuvenated by grinding. The sooner the grinding is done the less it costs. As to the choice between grinding or not grinding, there is only one answer that can be made by a road that is not overburdened with its surplus.

The cost of grinding is negligible in comparison with the cost of doing nothing.

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The Reciprocating Grinder is especially adapted to grinding out corrugations, slightly cupped and new joints where a planetary grinding surface facilitates the work.

RAILWAY TRACK-WORK CO.

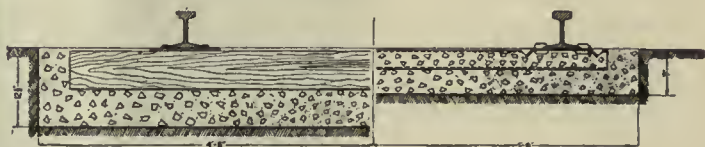
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Less Material, Excavation and Labor with *Steel Twin Ties*

The comparative cross section shows clearly the large difference in cubic contents of the track foundation required for Steel Twin Tie Track and a common type of concrete construction.

Only eight hundred cubic yards of excavation and seven hundred and ninety cubic yards of concrete are required per mile of Twin Tie Track.



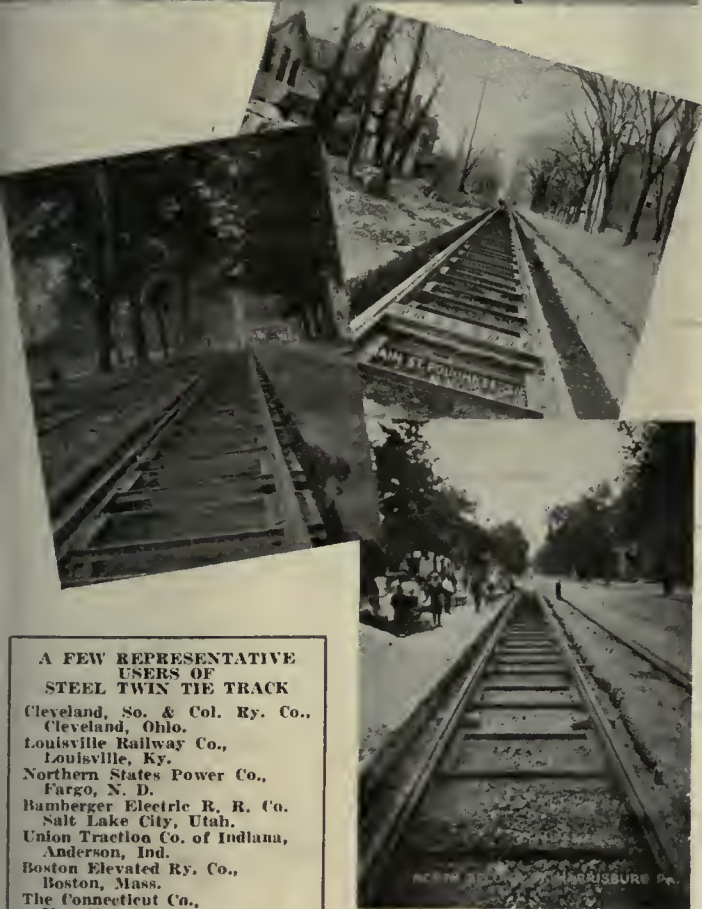
The labor saving in laying the track ready for concrete is largely dependent on two features of Steel Twin Ties.

The eight hundred and eighty steel twin ties required per mile weigh only one-third as much as two thousand six hundred and forty wood ties required per mile. Moreover, in fastening rail to the ties the simplicity of the jaw type rail clip saves up to fifty per cent of the time required to spike wood ties to the rail.

Careful check on these savings has been kept on track laid in 1920 and the savings vary from two thousand dollars to eight thousand dollars per mile of single track.

Write today for complete data and price at your material yard for use in preparing estimates.

THE INTERNATIONAL STEEL TIE CO.
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The manufacturers of Tulc sell lubrication service on this basis only.

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And after their recommendations are made you are given ample opportunity to *prove* their money saving value by means of actual operating tests—covering such a period as you may consider necessary for complete satisfaction.

Executives on many of the leading Electric Railroads in the country have learned that this is the only practical way to solve lubricating problems. Considering results solely from the money saving standpoint, it's by far the most economical way.

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accurately compounded to
reduce lubricating costs

SHELBY



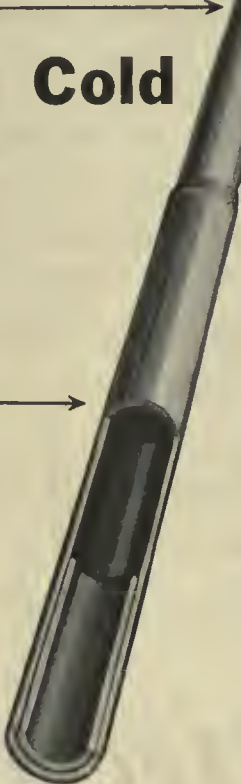
Diameter
1 in. Here →

Diameter
1 3/8 in. Here →

Seamless Cold Drawn Steel Trolley Pole

*Where There's Strain
THERE'S STRENGTH*

Diameter
1 1/2 in. Here →



In construction SHELBY TROLLEY POLES have much in common with fishing poles. Sudden jerks and drags exert strains on the butt of the pole in each case. Thus the butt must be stronger and yet the entire pole must be as light as possible.

Look again at the illustration of the SHELBY TROLLEY POLE. Note how the weight of the pole gradually reduces toward the point where the strain is lightest. In addition to its increased diameter the butt of the SHELBY POLE is reinforced on the inside, the reinforcement being made of the same material of which the pole is constructed—13 gauge Seamless Cold Drawn Steel. This reinforced member is made integral with the pole, its length varying to suit the requirements of strength.

SHELBY TROLLEY POLES are made in two types—Standard A and Standard B. While the three diameters remain the same in both poles the taper lengths vary, making Standard B pole about 20 per cent heavier and 50 per cent stronger.

Every pole is tested in a specially designed machine which infallibly detects any imperfection, and any which does not stand the test is rejected.

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Manufacturer of Railway Material and Electrical Supplies

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*Branch Offices: Boston, Scranton, Pittsburgh
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—and you can get everything electrical quickly from the same source

Some of the standard
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Caps and Cones
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“Supply Items” *are* important.
Hardly an act performed by
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To assist users of current to attain
uninterrupted service, this Com-
pany distributes the products of a
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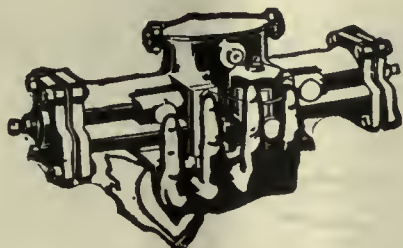
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combine to provide quick deliveries
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National
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The Central Station Lights the Way

Whether you are running a central station department or not, you can't help noticing the thousand and one labor-saving appliances which the central station is selling to the very people who are your customers.

It may be a washing machine, a vacuum cleaner, a phonograph motor or an electric curling iron—but whatever it may be it is something that suggests the use of power to people who have to pay five to ten times more for it than you do!

It's natural that a public educated in the use of these labor-saving appliances expects a similar change in electric railway equipment—say air-operated doors and steps instead of *hand-tugged* doors and steps, electric flasher signals instead of time-stealing bell-cords and real snap and dash in every move—from the stopping to the starting of the car.

That's the function of these labor-saving and revenue-making devices!

National Pneumatic

Door and Step Control
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THIS CAR
DIDN'T GET MUCH
OF A BUMP—BUT

THE REPAIRS COST THE RAILROAD
MORE THAN EQUIPPING A WHOLE LINE
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OPERATING WITHOUT THEM IS EXPENSIVE

FURNISHED IN VARIOUS SECTIONS DRILLED AND BENT TO SUIT YOUR REQUIREMENTS

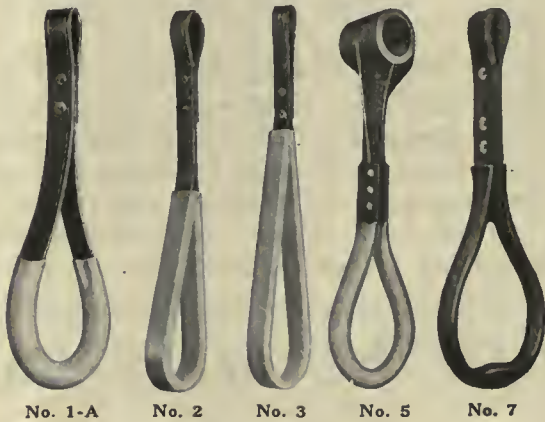
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STANDARD ON LEADING RAILWAYS

RAILWAY IMPROVEMENT CO.

RICO SANITARY STRAPS



A TYPE FOR EVERY CAR

61 BROADWAY, NEW YORK



CHESTER INSTALLS ECONOMY METERS



Economy Meter with Inspection Dial

Equipped with Car Inspection Dials

The Southern Pennsylvania Traction Co., Chester, Pa., has ordered a *complete equipment* of sixty-eight Economy Power-Saving Railway Meters with Car Inspection Dials.

This is the *third* property of the American Railways Co. syndicate to standardize on Economy Meters as Power-Saving Devices.

The first of these was the Chicago & Joliet Electric Railway Co., in 1915. The second, the Scranton Railway Co., in 1919.

Consistent high-savings in energy over a period of six years on the Chicago & Joliet line and similar results on the Scranton property justified the present order for a complete equipment at Chester.

Economy Power-Saving Railway Meters, by recording the kilowatt-hours consumed, show both the motorman and the management the individual "power bills." Thus they get down to the very fundamentals of energy checking and saving. In addition individual car energy records afford data of high engineering value and a convenient basis on which to inspect car equipment.

**Economy Meters
on more than
75 Railways**

Meter the energy—that's what you want to save

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Performance—the proving ground of service

It does not require engineering statistics to convince the practical mechanical man that ordinary oils cannot fulfill the requirements of railway service.

There is one, and only one, reliable test of the ability of lubricants—that of performance in actual service. It is this conclusive test of merit that has caused *Galena Oils* to be specified by the great majority of America's electric railways—they have done and are doing the work with an efficiency and economy that deserves and demands such preference.

It is the implicit confidence in the ability of Galena Oils—built upon the foundation of many years of unvarying, faithful performance—that enables this company to *guarantee* the delivery of lubrication service as specified by contract.

With less confidence in the quality or uniformity of a product, it is quite natural that such guarantee of performance cannot be made. Hoping to make good and *guaranteeing* to make good are two quite different propositions.

The unanswerable argument for Galena Oil quality must lie in the fact that they are the only railway lubricants that are absolutely guaranteed to perform specified service, the failure of the lower grade oils to give like service—after many trials—emphasizing by contrast the conspicuous merit of Galena products.

*Galena Quality Is Our Bond
and Your Security!*

THE GALENA-SIGNAL OIL CO.

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GALENA
SERVICE

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An article which increases efficiency, eliminates hazards, and reduces maintenance cost of existing equipment, merits investigation



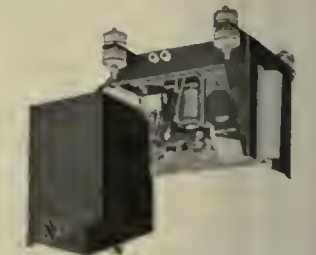
Line Breaker cover lowered showing relay

A Line Breaker Under the Car

A drum controller arcs destructively at the contacts when the motorman "notches 'er up" or shuts off. It's because the controller is not merely adjusting speeds, a service for which it is primarily intended, but it is also opening and closing the motor circuit. The G-E line breaker removes from the controller the function of opening and closing the main motor circuit and, through an overload relay, protects the motors against improper acceleration. It replaces the familiar overhead hand-operated breakers, putting the flash and noise down under the car where they can't cause panics or scorch hats.

In operation when the controller cylinder is notched to the first point and the fingers and segments are in contact, a ratchet switch in the controller closes, causing the motor circuit to be completed through the line breaker. The least backward motion of the controller handle opens the ratchet switch, which in turn immediately opens the line breaker contacts. It is then necessary to turn the controller cylinder to the "off" position and on again to close the circuit.

G-E line breaker equipments are cutting controller maintenance cost and making car operation more economical on many street railways.



Cover removed showing contactor



Ratchet switch installed in bottom of controller

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 57

New York, Saturday, June 18, 1921

Number 25

The N. E. L. A.'s Contribution to Power Plant Literature

THE National Electric Light Association does a good piece of work for more than its own members in the compilation each year of treatises on power matters. The reports of its special committees are so complete that they are useful to all power consuming industries. This is particularly true of the report of the committee on prime movers, which has now come to be a veritable encyclopædia in its field. The 1921 report, abstracted elsewhere in this issue, is a voluminous document replete with data which are just as applicable in the electric railway field as in that from which they were collected. The American Electric Railway Engineering Association has a committee on power generation and other committees whose activities parallel even if they do not duplicate those of the N. E. L. A. committee. It might be in the interest of economy of money and effort for the corresponding committees of these two and other associations to get together in some way. A practical suggestion to begin with is that the Engineering Association committee on power generation bring up for discussion at Atlantic City some of the high spots in the N. E. L. A. report.

One excellent feature in the compilation of this report is the way in which manufacturers of power machinery and auxiliary devices are invited to tell what they are doing respectively to advance the art. While the N. E. L. A. takes no responsibility for these statements, it does act as the clearing-house for the information. At the same time the manufacturers' statements are brought up for scrutiny and woe betide any one whose expressed hopes for his product do not tally with service performance.

Nominations for Mayor Come Thick in June

LIVELY times appear to be ahead this summer for New York City. The politicians are working overtime, and the near politicians are doing the same. The day is already counted lost upon which some one does not arise to announce himself as candidate for Mayor at the fall election. There are reforms enough ahead for busy hands to carry out, but the one to which all aspirants look longingly is the traction issue. Mr. Hylan, the present incumbent, seeks to preserve the present 5-cent fare. Mr. Bennett, another aspirant, seeks to restore it. Whatever other hopes and ambitions Mr. La Guardia and Mr. Curran, receptive candidates, may have, they also see the traction issue as one of the outstanding questions calling for immediate attention. It seems strange that where there is such unanimity of opinion, there could possibly be so much confusion of thought.

Flimsy pretexts for making an issue of the traction question abound in the reasons advanced by all the prospective candidates, particularly in view of the law enacted by the last Legislature, but the present

Mayor cuts the most lamentable figure of all with his claims of preserving the 5-cent fare. The surface lines have practically all been broken up and returned to their original owners, so that 10 and even 15-cent fares are in force in many places where the 5-cent fare prevailed. Moreover, many lines have been discontinued entirely. As for the free transfer, it has become practically a thing of the past except at mass transfer points on the rapid transit lines. The passenger on the subway or the elevated pays a 5-cent fare, but then on these lines, tied in for operation under contract with the city, there is a deficit of many millions of dollars a year exclusive of interest on the city's investment for construction. This latter charge is passed on to the taxpayers and thence to the rent payer, who, in New York, is groaning under a frightful load of increased valuations and increased tax rates. Theoretically, a 5-cent fare. Practically, no such thing. It is not considered good form in the present age to confess to being old fashioned, but if one judges the transit situation in New York on the generally accepted standard of the past it would appear that Mayor Hylan, in contending that he has preserved the 5-cent fare, is guilty on the count of fraud.

A Dangerous Precedent in the Making

UNDER present circumstances, municipal ownership and operation of the entire local transportation system of Detroit seems inevitable—for better or for worse. Thus is the continuous political fight centering about the Detroit United Railway for more than twenty-five years apparently to be ended in the course of the next few years. The people have spurned all offers made by the private company and voted for municipal ownership and for the bond issues necessary to build new lines and to purchase certain existing lines. The municipal program has gained great momentum and it is being pressed forward on a big scale. Undoubtedly, the piecemeal system of purchasing existing lines which is being followed, with the franchises expired on a large part of the D. U. R. trackage, will prove very advantageous for the city. This will enable the municipal authorities to develop quickly a municipal transportation system of importance. Only those lines particularly wanted will presumably be purchased for a time, but as necessity to pay two fares to the two separate companies becomes more widespread, there will probably develop a pressing demand for complete municipal ownership.

The speed with which the municipal system is now being built and acquired is evidenced by the prospect of a mileage increased from 18 at the end of 1920 to 130 at the end of 1921. The project having gained such proportions, there is not an encouraging likelihood that the tide toward municipal ownership in Detroit will be stopped.

When all the circumstances are considered perhaps this is the only solution of Detroit's traction turmoil. The entrance of new interests in the D. U. R., as recently occurred, may change the situation. But if not, the concern of the industry is that the outcome of this particular quarrel while local in origin is far reaching in influence. If by chance the Detroit municipal ownership venture should appear to be a success, it will establish a powerful precedent for the ceaseless use of municipal ownership advocates—the first important precedent in the East and the most important in the country. Furthermore, if there can be such a thing as a successful municipal street railway system, the policies being pursued by the present Mayor, Street Railway Commission and management will tend to make it so. J. S. Goodwin, general manager, has declared that he has been under no political dictation as to jobs, equipment or methods, and that he has been free to build a railway system as a railway man would, taking into account the legal and physical limitations imposed. The railway organization has been built up of seasoned railway men who have years of experience with private railway companies behind them. As for the construction of the physical plant, while it may not be the best the industry has known, it is at least as good as that which has been built in recent years by many privately operated companies.

So far so good. While the present Mayor remains in control perhaps the railway venture will be conducted largely as a business proposition, free from political influence. But when a new administration steps in, what then? What assurance is there that the new Mayor will not succumb to the great temptation to exploit the railway, with its large number of jobs, to take care of his political henchmen and to use it in furthering his political power?

This is one of the great weaknesses of the municipal operation of any utility, especially one having so large a payroll as does a street railway. It is a great point of danger to the interests of the public. And in order that the public may know that its best interests will be served by a private transportation agency, it behooves the private companies continually to demonstrate this fact by providing excellent service at low cost and adopting constructive methods of creating and maintaining good public relations and public understanding of the aims of the company. This is the only dependable antidote for municipal ownership. When such conditions prevail, there will be no widespread demand for it, nor indorsement of the views of the unscrupulous persons who spread pernicious propaganda based largely on high-sounding falsehoods.

Avoid Contentious Publicity

THESE columns have been replete for a number of years with suggestions about the great desirability of the electric railways fostering publicity about themselves and of following the open door policy about all matters of information pertaining to them. Most of the companies that have undertaken this means of improving their relations with the public have met with some success. One example, however, stands out conspicuously as a failure. In this particular city, a persistent and energetic campaign of publicity has been engaged in for several years, but the attitude of the public toward the company has gone from bad to worse.

There is much to support the opinion that the nature of the publicity distributed has helped to undo the company rather than to improve its relations. This publicity has been largely controversial, full of rancor and more destructive than constructive. While all that has been said in the company's publication is probably true and perhaps was mild as compared to the provocation, yet aside from venting the feelings of the utility, not much was accomplished. It seems to have been pretty well demonstrated that the public is not sympathetic toward this kind of publicity and that it is not effective in accomplishing the object sought. This comment is made simply to point out the obvious lesson.

Brake Rigging Is an Important Safety Link in Car Equipment

THE great advantages of electricity as a motive power for use in railway service are its convenience, its economy in power, and the increase in track capacity made possible by its use. This increase in track capacity comes directly from the use of higher schedule speeds, which, in short runs, are made possible through higher rates of acceleration and retardation. In fact, the more adequate the provision for rapid and easy acceleration and retardation, when stops are frequent, the better the purpose of the railroad is served. It is obvious also that the saving in time secured during retardation is just as valuable as that obtained during acceleration. When braking commences, a car may possess substantially the same energy that was put into it from the power plant during acceleration. This energy can be dissipated in seconds or in minutes, but the shorter the time the nearer the company comes to getting double value from the power house, so far as time saved is concerned.

The fundamental necessity of a brake, both as a safety and a capacity increasing device, needs no emphasis, and the link in the braking process which connects the power-receiving end with the power-delivering end is the foundation brake rigging. This is as vital an element in brake mechanism as any other. With an idea of bringing more forcibly to the attention of its readers the value of keeping the foundation brake rigging in a high state of efficiency, this paper has been publishing in the past six monthly mechanical issues a series of articles by H. M. P. Murphy, describing the essentials of brake rigging and the forces developed during braking. This series of articles was written with the definite purpose of presenting this subject to the men responsible for brake operation and maintenance rather than to provide data for construction or design. The information has been given in as simple language as possible, and the mathematical formulas employed should not be confusing to the average workman. The examples have been taken from actual cases now in operation on existing electric railways, and the many illustrations given should enable the reader to see the essentials of the various parts, the functions that they perform and the importance of keeping all in proper condition and adjustment.

The concluding article of this series, which is published in this issue, deals particularly with piston travel and its effect on producing short stops through the saving of time in having this properly adjusted. When all parts are in proper condition, the capacity or pull of the rail is the measure of retardation that can be developed. However, with improper adjustment and worn parts, the

condition of the braking equipment is the measure of the retardation developed. This shows the value of proper maintenance and adjustment in this vital connecting link of the braking system, if high braking efficiency is to be maintained.

Investment in Instruction Takes Little Capital

MORE and more of late one reads in the popular magazines and house organs of instances where the patronage of customers is lost through discourtesy, or, to say the least, through thoughtlessness, on the part of the person coming in direct contact with the public. People have reached the stage where courteous treatment is not only expected but demanded, and any lack of a "please-the-public" attitude means the loss of trade, business, etc. If the business is such that a person may transfer his patronage to some other concern, he does so, and probably the incident sinks into oblivion in his mind. On the other hand, any incivility toward him in the sale of a commodity in whose selection or use he has no choice incurs a more lasting enmity.

Here is where the electric railway business meets a problem difficult of solution. Platform labor, perforce, is unskilled, but the industry must have high grade salesmen to sell rides. Regardless of the excellency of service, good will cannot be created or maintained without the utmost co-operation on the part of the employees of the railway.

Electric railways are confronted by this dilemma more than any other utility. Power and lighting are mere matters of maintaining an unimpeachable service over which the managers have a definite control. This is practically their only public contact and the criterion by which the public judges. The telephone approaches the railways in respect to the circumstances requiring the maintenance of pleasant relations with its clientele, but the direct contact in this case is lacking. A speedy connection followed by a good wire is all that is asked or, in fact, expected.

To have the man on the rear end working not only mechanically but in spirit is possible and is being done. The Fifth Avenue Coach Company has accomplished wonders in furnishing a well-liked service by having its conductors cultivate public friendship. There are numerous other properties the managements of which enjoy this reputation, but they are not numerous enough.

Instruction of new employees is a subject to which ever-increasing thought is being devoted, though principally to the mechanical details of the duties required. In this schedule of instruction a place should be given to teaching the fundamentals of salesmanship, a term which includes not only the ability to sell rides but to make the rider glad and satisfied with his purchase. True selling ability instills a "come-again" feeling in

the customer. It is a knack that must be cultivated and, when cultivated, capitalized. Now that the labor market is an employers' and not an employees', the men who, by training, can be developed into courteous and efficient salesmen should be sought. The support and confidence of the public can probably be no more quickly restored than through the trainmen, in whom has been instilled the paramount necessity of these virtues. Since the apogee of hardship has been passed, the time is now ripe to regain the public esteem in this respect and reap the valuable benefits therefrom.

Instruction of the sort mentioned requires only a very small capital outlay. This, with the fact that the returns are large, should make an appeal to railway men at this time.

The Function of Every Committee Should Be Clearly Defined

THE editors of this paper attend numerous committee meetings in the course of the year, many as guests, some as members. They thus gain a perspective of the inside work of several associations and secure "atmosphere" for their writing. The general impression gained from this salutary exercise is one of respect for the quality and quantity of the work thus done behind the scenes. At the same time committee activities often, nay generally, give evidence of lost motion through what might be termed "lack of definition of function or purpose."

It is a trite saying that in rifle practice a clear view of the target is essential to accuracy of aim, but the principle applies everywhere else, including committee activities. Hence before starting work, each committee ought to formulate its purpose, the needs of its clientele and the practical results which it can reasonably be expected to secure by consistent effort.

To be sure, many associations now set down lists of topics which committees are expected to consider, and this is all right as far as it goes. But it does not go far enough. Either the men who get up the lists, or the committees themselves, should define the point of view of the work. For example, take the heavy electric traction situation. It is a conspicuous case because committee work in this field is in the formative stage. Eight or nine national associations are active here. Their

committees are duplicating work. They neither individually nor collectively have their purpose clearly defined. They need a central steering committee, for which the name "American Committee on Electrification" would be appropriate. This would help them in the work of definition and in the equitable distribution of their activities.

One of the first articles in the constitutions of most organizations begins: "The purpose of this association is" The same plan might well be followed by committees in their work.

Quotation from the Federal Electric Railways Commission Report

No. 25

THROUGH this system of financing and management (holding companies and banker control) the utilities have been largely controlled by persons living distant from the community affected by a particular electric railway, whose prime consideration has been to secure a return upon the property. This "absentee" management and control has not been successful in bringing about the proper spirit of co-operation between the local managers, employees and the public. Since the electric railway companies come into immediate daily contact with large numbers of people, it is of the utmost importance that the industry should gain and hold the respect, confidence and good will of its patrons. If the local public should invest its money in the stock and bonds of its local utilities there would be an improvement in the relations now existing between the corporation and the public.

Shop Notes from Buffalo

Reclamation Shop Is Producing Attractive Savings—Dipping of Motor Shells a New Feature—Ingenious Plan for Portable Mounting of Electric Locomotive Control Apparatus Developed—Shop Layout Changes Here and There Tend to Facilitate Maintenance Practice

THE practices followed in the Cold Spring shops of the International Railway at Buffalo, N. Y., now operated by the Mitten Management, Inc., have been mentioned and illustrated in the ELECTRIC RAILWAY JOURNAL from time to time. Recent articles have covered dipping and baking of armatures and field coils (Feb. 21, 1920, page 286) and compressor maintenance (March 3, 1920, page 608). Although these shops have been in use for many years they are well adapted to modern maintenance practices and they are being constantly modified to meet changing conditions. The present article embodies the observations of a member of the editorial staff of this paper who visited the shops recently.

THE WELDING SHOP

The outstanding feature of recent changes is a welding shop where gas, electric and thermit welding is done in close co-ordination with the sheet metal and forge shops. The three shops are operated under the



IN THE CENTER OF THE MACHINE SHOP IS HOUSED THE ELECTRICAL DEPARTMENT, IN AN INCLOSURE SET OFF BY A PARTITION MADE OF OLD CAR DOORS

foreman of the reclamation department, who is thus able to subdivide the reclamation work among the three to produce the best over-all results. The welding and sheet metal shops occupy a long narrow room, 16 ft. wide, which was created by putting a concrete roof with skylights over a runway between the truck shop on one side and the wheel and blacksmith shops on the other. At present the 150 ft. of available length is divided up by means of light partitions thus: The tin shop has 32 ft.; the welding shop (including small of-

fice), 102 ft., and the motor-shell oven, 16 ft. The reclamation or welding shop may be considered as divided longitudinally in half, one side being an 8-ft. runway and storage space, which is served by a trolley crane. On the other side are stalls separated by light, portable partitions, about 8 ft. high, for the three types of welding. The generator used to furnish acetylene for the gas welding is housed in a small "lean-to" adjacent to the tin shop.

A summary of the work which has been done in the



TWO VIEWS IN THE NEW WELDING SHOP

View at left is toward tin shop and shows crane and crane runway, electric welders in foreground and thermit welder in background. View at right shows thermit welder in foreground at work on the repair of a truck frame. The portable partitions between welders' stands were removed for the purpose of making these pictures.



MICHIGAN STREET FRONT OF COLD SPRING SHOPS

The photographer fortunately caught two important pieces of equipment just as they were being put away in the carhouse.

reclamation shop during recent months, as gaged by the dollars saved over costs of replacement without reclamation, is given in an accompanying table.

Among recent interesting jobs of welding two were those illustrated. One is a repair to a piece of manganese special trackwork, a switch in which the tread had been broken away. An insert was welded in to replace the broken part and a plate was welded on the side to support it, with the excellent result shown. The second job is the welding of oil boxes on the bearing housings of old motors built for grease lubrication, also illustrated. The routine work consists of the usual run of patching worn and broken gear cases, mending broken motor shells, etc. Thermit is used to a considerable extent on truck frames, the material being bought in large quantities. This is done in the interest of durability, on the principle that where much metal is to be added the thermit process is in the end economical, even if more costly at the time because the metal in the weld is of very high quality.

DIPPING AND BAKING PROGRESS

Supplementing former dipping and baking practice, as described in the earlier article referred to, the company is now subjecting small motor shells to this process and is preparing to do the same even with the largest



PART OF ROW OF BABBITT POTS

These are heated by gas or kerosene burners and have thermostatic control for babbitt temperature.

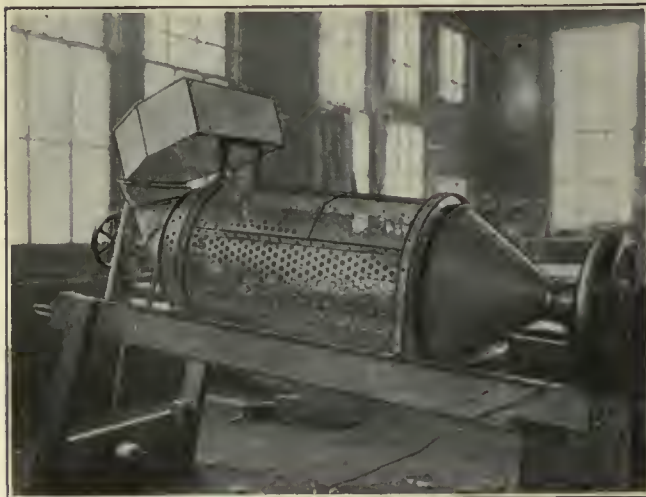
motors. A heavy black varnish is used for fields and clear varnish for armatures. A special large dipping tank has been installed near the front of the motor overhaul shop.

In connection with the dipping and baking equipment used for armatures and field coils, located near the armature room, it is proposed to substitute a monorail crane for the one now in use, which requires the transfer of baskets of field coils from a crane bar outside the oven to one inside. The proposed monorail would run direct into the oven.

SOME RAPID PIPE THREADING

Among other recent time-savers is a double pipe-threading machine, which has been provided with an electric motor drive. This is installed in the air brake shop, where it is used for threading brake pipe, as well as conduit for use in rewiring cars, a job which is under way near by.

The spindles of the threading machine are geared to run at 75 r.p.m. and an inch of thread can be cut in about 6 seconds on a 1-in. or $\frac{3}{4}$ -in. pipe. The thread cutting dies kept normally in the machine are those for the two most commonly used sizes of pipe, so that a pipefitter who needs a piece of pipe threaded can do this work with a minimum of time and effort.



THIS MACHINE SORTS PAPER TICKETS AND COINS BY MEANS OF A ROTATING PERFORATED DRUM AND A CENTRIFUGAL FAN



SLIDING FRAME USED IN MOUNTING CONTROL APPARATUS ON ELECTRIC LOCOMOTIVE. ROLLERS STILL TO BE ATTACHED

SUMMARY OF CASH SAVED BY THE RECLAMATION DEPARTMENT FOR THE YEAR 1920 AND PART OF 1921

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Electric equipment:														
Armature parts	\$307.32	\$124.50	\$158.12	\$219.29	\$28.56	\$172.70	\$160.07	\$54.68	\$201.37	\$281.12	\$313.77	\$174.19	\$126.28	\$193.40
Great cases	732.52	911.96	626.69	903.14	1,498.35	1,447.79	1,220.99	1,322.35	742.91	2,199.67	1,490.04	1,122.91	1,452.66	1,422.25
Motor shells	.....	715.00	615.00	830.00	345.00	865.00	1,015.00	1,885.00	745.00	335.00	260.00	624.50	130.00	390.00
Motor caps	.....	36.96	25.41	6.93	16.17	20.79	13.86	13.65	35.72	44.16	11.55	56.75	3.60	9.00
Miscellaneous electric	8.77	.....	71.85	40.33	65.54	148.59	52.93	34.78	136.79	145.44	146.26	223.42	156.88	65.69
Brakes	.....	.....	.....	9.61	35.91	55.89	55.90	14.74	111.67	64.02	176.30	91.20	123.49	15.51
Air brake and compressor	69.70	.....	.....	.....	.....	72.00	36.00	177.90	140.75	224.67	70.60	143.87	19.40	5.12
Air tank and valves	35.30	.....	.....	.....	.....	65.40	83.48	73.58	165.32	330.22	357.03	340.54	566.31	295.34
Brake levers and miscellaneous	72.73	7.05	28.50	66.25	18.29	.....	.....	.....	.....	.....	.....	.....	.....	.....
Car body:														
Seats, doors, steps, etc.	416.46	.....	47.38	137.58	118.48	272.85	224.72	239.60	301.96	514.37	432.52	439.17	269.42	565.13
Trucks:														
Truck frames	1,592.00	2,982.00	4,176.00	2,500.00	4,176.00	4,156.00	2,926.00	2,102.00	1,648.00	1,037.00	1,490.00	4,116.00	1,754.00	6,502.00
Truck miscellaneous	33.85	24.85	285.32	495.21	70.73	164.57	271.33	261.73	436.78	568.25	1,054.90	787.65	868.43	460.77
Trucks:														
Truck and service equipment	52.25	.....	25.00	25.00	21.00	64.00	24.00	32.20	9.00	13.50	77.35	73.05	89.25	710.43
Tools	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tools and equipment	20.00	2.10	14.00	5.00	9.95	8.00	8.50	5.60	5.00	12.50	38.05	22.20	21.05	37.05
Miscellaneous welding and cutting with gas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Castings and forgings	113.10	310.69	299.66	251.28	329.87	818.81	838.21	714.19	759.34	813.66	448.64	395.75	618.46	789.84
Total	\$3,474.79	\$5,115.11	\$6,372.93	\$5,489.62	\$6,733.85	\$8,332.39	\$6,930.99	\$6,932.00	\$5,439.61	\$6,583.58	\$6,367.01	\$8,611.20	\$6,689.23	\$11,461.53
1920—Grand total	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1920—Average saving per month	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Mention of the conduit suggests that as cars go through for extensive overhaul they are being re-wired in metal conduits in accordance with a systematic plan. This will be an important item in reducing car maintenance cost. In connection with this change in wiring, the jumper sockets for cars equipped to operate in trains are being mounted on the drawheads in the manner shown in one of the illustrations. This not only permits the use of shorter jumpers but reduces wear on the jumpers, which was excessive when the sockets were mounted on the bumpers.

An interesting job recently put through the shop was the remodeling of one of the Lockport line freight locomotives, which has been in service many years. This locomotive has the cab in the center with a projecting hood at each end to cover the auxiliary apparatus. The air apparatus is on one end and the resistance frames and connection board are on the other. All of the resistance frames and accessories have been mounted on a framework made up of strap steel, as illustrated, the whole mounted on rollers so as to roll on rails. The photograph reproduced was taken before the rollers had been put on, but shows the resistance frames in place. This gives a portable mounting, by means of which the whole group of devices can be drawn out into the cab for inspection and repair.

Considerable study has been given to the lighting of the shops, particularly in the armature and machine shop. An arrangement which has been found entirely satisfactory is to place 500-watt nitrogen-filled incandescent lamps, 20 ft. apart each way, and about 20 ft. from the floor. These are mounted in home-made funnel-shaped tin reflectors about 2 ft. across the bottom. The effect secured is very much like daylight and except for close work no supplementary, individual lamps are required. As will be noted in the general plan, the electric shop is partitioned off from the machine shop. The partition is made of discarded car doors which were mounted in simple framing. This provides a partition

Date.....

INTERNATIONAL RAILWAY COMPANY
MECHANICAL DEPARTMENT

CAR RECORD

Date out of shop.....	System painting.....
Car No.....	Control.....
Height rail to first step.....	Circuit breaker.....
Height step to platform.....	Fuse box.....
Height platform to floor.....	Heaters.....
Air brake.....	No. lights.....
Air compressor.....	Type motors.....
Style lifeguard.....	No. of motors.....
Style trolley base.....	Gear ratio.....
Style headlight.....	Diameter of wheels.....
Style trolley catcher.....	Type trucks.....
Style signs.....	Wheelbase.....
Style seats.....	King bolt centers.....
Style upholstering.....	Seating capacity.....
Style registers.....	Size of axles.....
Style sander.....	Total weight of car.....

Inspector.....

INSPECTOR'S RECORD OF CAR CHARACTERISTICS



THE ELECTRICAL SHOP IS WELL EQUIPPED FOR ARMATURE WINDING AND TESTING



MOUNTING THE JUMPER SOCKETS ON THE DRAWHEADS
REDUCES JUMPER TROUBLES

which is amply high to give the privacy necessary to efficient work, while at the same time the electrical department quarters are well ventilated and lighted.

In connection with the electrical shop, a feature of interest is a new testing switchboard, with a water rheostat mounted directly behind it. The rheostat consists of a wood tank, with suspended plates operated by a screw, which terminates in a handwheel on the

front of the switchboard. The reclamation department is not the only one which makes use of welding and cutting apparatus. For example, in the rehabilitation job on interurban cars, mentioned earlier, it was found economical to use a gas torch in cutting out metal pieces which were scheduled for removal, such as brackets, straps, etc. These large cars are equipped with coup-



OIL BOX WELDED ON BEARING
HOUSING OF OLD MOTOR



THIS MACHINE MAKES PIPE THREADING AN
EASY JOB

lers which connect the air line as well as furnish mechanical coupling, although the electric lines are separate. It was found desirable to supplement the large couplers by extra drawheads to permit coupling city cars to the interurbans.

The practice of using slat seats and backs has recently been adopted. A photograph reproduced shows one of the seat backs as changed over from the cane-covered cushions formerly used.

On the interurban cars also the Miller trolley shoe is used. This operates satisfactorily, but it is found that it must not be allowed to run too long so as to wear into grooves.

In the Forrest carhouse of the International Railway an ingenious jib crane has been installed to permit light repairs to be made. The crane was fabricated out of old 6-in. T-rails, two being used to form a column. The two rails for this purpose are placed side by side with heads and base reversed and bolted firmly together. The upright is set 4 ft. in a concrete floor and the upper end is secured to one of the beams forming the roof trussing. The boom, also made of two T-rails, is supported by a diagonal brace of rails below and a guy rod extending from the outer end to the upper support of the vertical column. The boom is hinged to the upright so as to give it range of action ample for the purpose for which it is used.

One of the accompanying illustrations shows a machine which has recently been developed in the shops for the purpose of separating the metal tokens and coins from paper transfers. It consists essentially of a motor-driven rotating perforated cylinder with a hopper at one end and a suction fan at the other. The perforations are just large enough to clear the largest coins, and inside are longitudinal veins which raise and drop the contents of the cylinder.



WOOD SLAT SEATS AND BACKS
FOR INTERNATIONAL'S CARS



PIECE OF SPECIAL TRACKWORK REPAIRED BY
ELECTRIC WELDING

Piston Travel and Shoe Clearance*

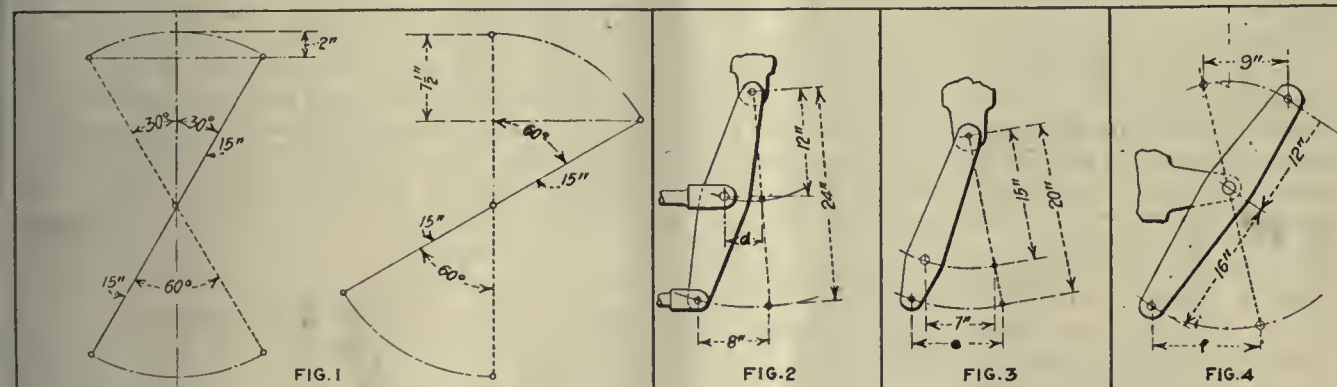
The Relation Between Piston Travel and Shoe Travel Is Determined—With a High Total Leverage Slight Shoe Wear Produces a Great Variation in Piston Travel Which Is Objectionable—
Various Examples Illustrate Methods for Finding the Motion of Levers and Their Proper Release Positions

By H. M. P. MURPHY

THE term "total leverage" represents the total number of pounds of brake-shoe pressure that are obtained for each pound of force exerted on the brake-cylinder push rod. Consequently it is clear that in order to obtain any desired degree of braking force or percentage of braking power on a given car, with a specified air pressure in the brake cylinder, the greater the value of the total leverage employed the smaller is the size of the brake cylinder required, and, therefore, in order to reduce the cost of installations and also to minimize the amount of compressed air used in an application of the brakes, it is always advisable to use as high a total leverage as is consistent with good practice. On the other hand a very high total leverage is objectionable because with it slight shoe wear produces a great variation in piston travel. The reason for this is explained below.

over, in traction service the amount of air consumed per car would be excessive if the piston travel were long and the leverage low (a high leverage permitting the use of a small brake cylinder for a car of given weight) as brake applications are usually very frequent in such service. For these reasons it is customary to adhere as closely as possible to the piston-travel standards which have been fixed by the best practice, and which must be carefully maintained in service in order to secure satisfactory results. It is important to note in this connection that the standard piston travel should always be the average of the maximum and minimum values actually obtained.

A further reason for adhering to established standards of piston travel and braking power is that it is most essential to provide for clearance between the brake shoes and the wheels when the brake is released.



DIAGRAMS SHOWING MOTION AND POSITION OF VARIOUS LEVERS

The increase in piston travel due to the wear (or travel) of brake shoes is equal to the average amount of wear (or travel) of the shoes multiplied by the total leverage employed. For example, if in a certain brake system the average wear per shoe is 0.2 in. in a given time, and if the total leverage is 9, the increase in piston travel (due to the specified amount of shoe wear) will be equal to $0.2 \times 9 = 1.8$ in.

To secure the proper operation of the automatic brake, which depends largely on the relative volumes of the auxiliary reservoir and the brake cylinder, it is important to use a reasonably low total leverage and thus to maintain an approximately constant piston travel in spite of ordinary shoe wear. In steam-road service, where the cars receive attention at only long intervals and where the piston travel is not adjusted regularly, a lower total leverage is necessary than in electric railway service, where systematic inspection and maintenance can generally be relied upon. More-

Now, as there is always a certain amount of lost motion in a foundation brake rigging, the use of either a very high total leverage or an excessively short piston travel might easily result in the dragging of the brake shoes. Of course, if there were no lost motion between the push rod and the shoes the shoe clearance would be exactly equal to the piston travel divided by the total leverage. Thus, if the piston travel is 5 in. and the total leverage is ten, the shoe clearance would be five divided by ten, or $\frac{1}{2}$ in. However, owing to the clearances in the pin holes and to the spring and "give" of the various parts of the rigging, the shoe clearance would actually be considerably less than this value.

Further, the piston travel obtained when a car is standing is usually an inch or two less than that obtained when a car is running, because the vibration and motion of the various parts provide for their better adjustment in the latter case. Consequently allowance should always be made for this inequality, as it is the correct "running" piston travel that must be maintained. Of course, if the brakes are applied while the

*This is the sixth and last of a series of articles on forces developed in brake riggings. Others appeared in the Jan. 15, Feb. 19, March 19, April 16 and May 21 issues of this paper.

train is in motion and held on till and after the stop is made and thus measured the piston travel will have the "running" value.

DETERMINING THE MOTION AND POSITIONS OF LEVERS

A very important consideration in the installation and adjustment of brake apparatus is the motion or travel of the various parts concerned. In dealing with this subject, the primary requirement is, of course, that the location and dimensions of all moving parts be so chosen that each lever and rod will always be unobstructed in its movements, even when the brake shoes are worn down completely and the brake-cylinder piston has traveled to its maximum limit. Otherwise the brake might easily be rendered totally ineffective. An additional requirement of good practice is that all levers, except the truck levers, should stand at right angles to their connecting rods when the brake is fully applied and the piston travel has the standard running value for the case in question. This applies particularly to the two cylinder levers. The connecting rods will thus maintain their required approximately parallel directions much more nearly than would otherwise be the case, for obviously when a lever is moved through half of a specified angle on each side of a perpendicular position with respect to the connecting rods, the resulting deflection of these rods will be much less than when the lever is moved through the same angle but not equally on both sides of the perpendicular. This is illustrated in Fig. 1.

In order to determine the travel or the position of any moving part of a brake rigging, it is merely necessary to remember that when a lever (or standard bell crank) turns about one of its three points as a center, the two other points travel in circular paths, and therefore the length of the path passed over by each of these points is in direct proportion to its distance from the center about which the lever turns.

To illustrate this principle consider the levers shown in Figs. 2, 3 and 4. In Fig. 2 the lower end point is known to travel 8 in., and consequently the distance, d , traveled by the middle point is found thus:

$$d = \frac{12}{24} \times 8 = 4 \text{ in.}$$

Again, in Fig. 3, the middle point is known to travel 7 in. and, therefore, the distance, e , traveled by the lower end point is found thus:

$$e = \frac{20}{15} \times 7 = 9\frac{1}{3} \text{ in.}$$

Also in Fig. 4, the upper end point is known to travel 9 in., and consequently the distance, f , traveled by the lower end point is found thus:

$$f = \frac{16}{12} \times 9 = 12 \text{ in.}$$

A general rule may now be readily stated as follows: When a lever or bell crank turns about one of its three points as a fixed center, and the travel of a second point is known, to find the travel of the third point divide its distance from the fixed center by the distance of the second point from the fixed center and multiply this result by the known travel of the second point.

In cases where a lever has no positively fixed point, as for example a cylinder lever or a live truck lever, the problem of finding the travel of a specified point can also be easily solved by the foregoing rule if each of the two points whose travel is given by the conditions of the

problem is considered in turn as being fixed. In order to illustrate this method the following examples will be given:

Let it be required to find the total travel of the pull rod, in Fig. 5, necessary to take up 1 in. of shoe clearance on each pair of wheels. The clearances of 1 in. are represented in the figure by the distances BG and EM , the position of the mechanism before the brake is set being indicated by the lines ABC , CD and DEF .

It is obvious from an inspection of the diagram that the total travel of the pull rod is equal to the travel necessary to bring the left-hand shoes against their wheels plus the travel necessary to bring the right-hand shoes against their wheels. Now, assuming that the rigging is drawn in its release position ($ABCDEF$), consider that the point E is temporarily fixed and that the pull rod is moved to the right until the left-hand shoes are brought tight against their wheels, the lever, ABC , assuming the position AGH , the rod CD moving to the position HK , and the lever DEF taking the position KEL . Then, to find the distance FL (i.e., that part of the travel of the pull rod necessary to apply the left-hand shoes) it is only requisite to find the distance KD , which is, of course, exactly equal to the distance HC ,

$$\text{and, as } A \text{ is fixed point, } HC = \frac{28}{21} \times BG = \frac{28}{21} \times 1 \text{ in.} \\ = 1\frac{1}{3}, \text{ whence } KD = 1\frac{1}{3} \text{ in. and}$$

$$FL = \frac{21}{7} \times KD = \frac{21}{7} \times 1\frac{1}{3} = 4 \text{ in.}$$

The point K , instead of E , may now be considered as a fixed point (which it actually is as it cannot be moved any further to the left) and the pull rod may be moved to the right till the right-hand shoes are brought tight up against their wheels, the lever KEL assuming the position KMN . The distance LN (i.e., that part of the travel of the pull rod necessary to apply the right-hand shoes) being found thus, as K is now a fixed point:

$$LN = \frac{28}{7} \times EM = \frac{28}{7} \times 1 \text{ in.} = 4 \text{ in.}$$

Consequently the total travel of the pull rod is

$$FL + LN = 4 \text{ in.} + 4 \text{ in.} = 8 \text{ in.}$$

Let it be required to find the total piston travel necessary to move each of the pull rods in Fig. 6 a distance of 5 in. as shown. The release position of the rigging is indicated by the lines ABC , BE and DEF . The piston travel necessary to bring the lever DEF into the position DKL may be found by considering point C of lever ABC as a temporarily fixed point and then causing the lever ABC to assume the position GHC , for the distance EK is equal to BH , and as D is a fixed point,

$$EK = \frac{16}{36} \times FL = \frac{16}{36} \times 5 \text{ in.} = 2\frac{2}{3} \text{ in.}$$

$$\text{whence, } BH = 2\frac{2}{3} \text{ in.}$$

and, therefore, the piston travel (AG) required to move the left-hand pull rod a distance of 5 in. is,

$$AG = \frac{36}{20} \times BH = \frac{36}{20} \times 2\frac{2}{3} \text{ in.} = 4 \text{ in.}$$

about the point H , till it assumes the position MHN . a fixed point (which it actually is as it cannot be moved any farther to the right) and the cylinder push rod moved out still further till the right-hand pull rod has traveled the required 5 in., the lever GHC revolving about the point H , till it assumes the position MHN . It is now clear that the piston travel necessary to move

the right-hand pull rod a distance of 5 in. is equal to GM , and as H is now a fixed point,

$$GM = \frac{16}{20} \times 5 \text{ in.} = 4 \text{ in.}$$

Consequently, the total piston travel required to move both pull rods 5 in. each is,

$$AG + GM = 4 \text{ in.} + 4 \text{ in.} = 8 \text{ in.}$$

DETERMINATION OF THE PROPER RELEASE POSITIONS OF LEVERS

In designing a brake rigging, the method generally preferred is to make the layout with the brakes in release position, the positions assumed by the parts concerned, when the brake is applied both with new and worn-out shoes and also when the piston travel has its maximum possible value (which is usually 12 in.), being carefully laid off, to make certain that no obstruc-

tion point R has traveled the required 5 in., as shown, the lever assuming the position EQF . The distance b , which locates the release position of the lever EF , is found by aid of the rule for lever motion as follows:

$$b = \frac{16}{8} \times 5 \text{ in.} = 10 \text{ in.}$$

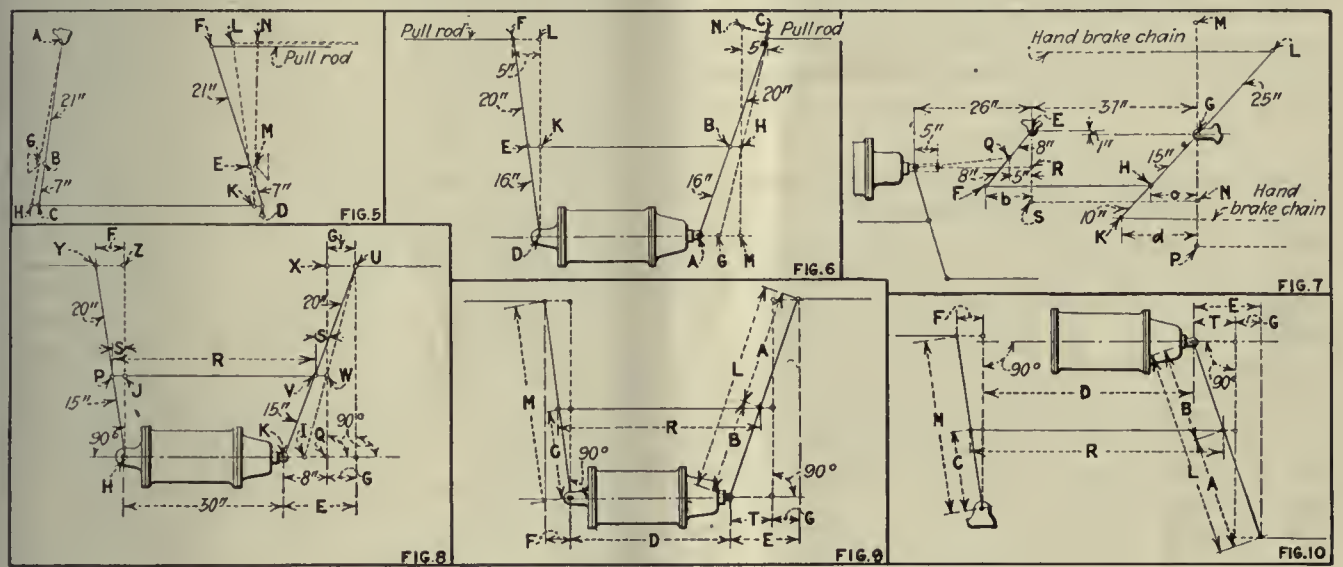
and as the rod SN has assumed the position FH , the lever GNP has swung into the position GHK , the distance c being approximately equal to b ; that is,

$$c = b = 10 \text{ in.}$$

Consequently the distance d , which locates the release position of the lever GK , is found as follows:

$$d = \frac{25}{15} \times c = \frac{25}{15} \times 10 \text{ in.} = 16\frac{2}{3} \text{ in.}$$

Moreover, the proper length of the rod FH or SN should be just 37 in., as may be seen by an inspection



TRAVEL OF PULL RODS AND POSITIONS TAKEN BY LEVERS

tions to the proper motion of these parts will be met. In order to accomplish this, and also to determine the release positions which the various parts should have (as well as the lengths of tie rods, etc.), so that the main levers may stand at right angles when the brake is set and the piston travel has its standard value, it is merely necessary to apply the rule previously given for the motion of levers, etc. The following examples will illustrate the general methods employed for this purpose:

Let it be required to find the release positions of the two hand-brake multiplying levers applied to an electric car on which the piston travel is to be 5 in., if these levers are to stand at right angles to the center line of the car when the hand brake is fully applied. The dimensions and general location of these levers are shown in Fig. 7. The points E and G are fixed.

The first step is to draw the lines ES and MP through the points, E and G , so that they are perpendicular to the center line of the car. Next, lay off $ER = EQ$, $ES = EF$, $GM = GL$, $GP = GK$ and $GN = GH$. Then the lines ERS , SN and $PNGM$ represent the position which the rigging should assume when the brake is applied. The release positions of the levers may now be found with respect to the lines ES and MP . Let the lever ES be swung to the left till the

of the figure, and the length of the chain attached to the cylinder push rod should be 26 in. minus 5 in., or 21 in. The lever LK or MP is designed to permit of the application of the hand brake from either end of the car. When the brake is applied from the right-hand end, the portion of this lever to be considered is GNP or GHK , just as if the portion GL or GM were not attached to it and when the brake is applied from the left-hand end of the car the portion to be considered is LGH or MGN , just as if the portion HK or NP were not attached to it. In either of these cases, it is evident that when a given force is applied to the hand brake chain concerned, the forces delivered to the points H and N will have the same values.

Let it be required to find the proper release positions of the cylinder levers shown in Fig. 8 so that when the piston travel is 8 in. both levers will stand at right angles to the center line of the cylinder, the total braking force and shoe clearance on each truck being the same and consequently half of the piston travel being used to apply the brakes on each truck.

First, draw perpendicular lines through the points H and Q , the latter being 8 in. (which represents the given piston travel) from the point K . The location of the center line of the connecting rod PV or JW is, of course, given by the dimensions of the levers, and the

distance PJ is equal to VW . Then considering the point U as temporarily fixed:

$$PJ = VW = \frac{20}{35} \times (\frac{1}{2} \text{ piston travel}) = \frac{20}{35} \times 4 = 2\frac{2}{7} \text{ in.}$$

Next, by drawing the lines HPY and KVU , the release positions of the levers are determined, for

$$F = YZ = \frac{35}{15} \times PJ = \frac{35}{15} \times 2\frac{2}{7} = 5\frac{1}{3} \text{ in.}$$

Also,

$$G = XU = \frac{20}{15} \times QI = \frac{20}{15} \times 4 = 5\frac{1}{3} \text{ in.}$$

and,

$$E = KQ + G = 8 \text{ in.} + 5\frac{1}{3} \text{ in.} = 13\frac{1}{3} \text{ in.}$$

The length of the rod PV or JW must clearly be equal to the distance HK plus the piston travel; that is, $R = PV = JW = HK + KQ = 30 \text{ in.} + 8 \text{ in.} = 38 \text{ in.}$

As the type of problem illustrated by this example is an extremely common one and must, therefore, be solved very frequently, a short method for determining the distances F , G , E and R (see Figs. 8, 9 and 10) will now be given.

FORMULAS FOR DETERMINING THE PROPER RELEASE POSITIONS OF CYLINDER LEVERS

The following formulas are entirely general and apply to all cases where the total braking force and shoe clearance are the same on both trucks, whether the cylinder levers are or are not divided in the same ratio, or whether they have the same total length or not. The symbols used are indicated in Figs. 9 and 10, T representing in all cases the standard piston travel for the car in question, *i.e.*, T is the piston travel for which the levers are to be at right angles to the center line of the cylinder when the brake is set.

The formulas are:

$$G = T \times \frac{A}{2 \times B}; F = T \times \frac{A \times M}{2 \times L \times C}$$

$$E = T \times \left(1 + \frac{A}{2 \times B}\right) R = T + D$$

To show how the use of these formulas simplifies calculation, let it be required to solve the example given in the preceding paragraph and covering the construction of Fig. 8, where the following values are assigned to the various symbols:

$$A = 20 \text{ in.}, B = 15 \text{ in.}, L = 35 \text{ in.}, C = 15 \text{ in.},$$

$$M = 35 \text{ in.}, T = 8 \text{ in.}, D = 30 \text{ in.}$$

Substitution of the given numerical values of A , B , L , C , M , T and D in the formulas gives the desired results, thus:

$$G = T \times \frac{A}{2 \times B} = 8 \times \frac{20}{2 \times 15} = 5\frac{1}{3} \text{ in.}$$

$$F = T \times \frac{A \times M}{2 \times L \times C} = 8 \times \frac{20 \times 35}{2 \times 35 \times 15} = 5\frac{1}{3} \text{ in.}$$

$$E = T \times \left(1 + \frac{A}{2 \times B}\right) = 8 \times \left(1 + \frac{20}{2 \times 15}\right)$$

$$= 8 \times 1\frac{2}{3} = 13\frac{1}{3} \text{ in.}$$

$$R = T + D = 8 + 30 = 38 \text{ in.}$$

Thus the same results are obtained by this simple method as were found by the long process previously employed.

Progress in Prime Mover Design and Practice

N. E. L. A. Committee Returns a Bulky Report Indicating the Recent Improvements and Standardizations Effected in Power Generation

LAST week a brief report of the National Electric Light Association convention, held at Chicago from May 31 to June 3, was printed together with an abstract of the report of the committee on steam railroad electrification. The committee on prime movers, of which N. A. Carle is chairman, produced a masterful and inclusive compilation on practices and tendencies in steam power generation. The committee has not duplicated the efforts of other societies but has co-operated with them.

The report comprised more than 350 pages nearly as large as the pages of this paper. The function of this committee was stated to be "to investigate and report developments in the design, installation and operation of prime movers and accessory equipment for the production of power from fuel for the generation of electricity." The report covered the several phases of the subject as summarized below:

In steam turbines the maximum size of single-cylinder units is still limited to 45,000 kw., and there has been no appreciable change during the past year in steam pressures and temperatures, although it is felt that higher pressures and temperatures are a possibility for future application. The trend of European practice seems to be toward definitely higher speed, higher superheat and higher pressures. In addition there is a tendency to standardization of performances, ratings, tests guarantees and principal dimensions of turbo-generators. It is felt that similar action by American interests would be productive of much good.

Turbine lubrication is receiving much attention. It imposes complicated requirements on the manufacturer and the oil refiner. The committee offered for consideration a tentative general specification for turbine oils. As regards oil purification, the continuous system and the continuous by-pass system are the most effective.

The latest development in turbine foundation design is the three-point flexible suspension devised by Akimoff. Accurate static and dynamic balancing are recognized by turbine manufacturers as of prime importance. Machines which have been scientifically balanced show a marked improvement in their operation.

Manufacturers are working on the development of a closed system of generator ventilation, in which the same body of air is constantly recirculated. The basic idea is to obtain cleaner air than is possible by washing free air, and to reduce fire hazards.

In condensing equipment the regulation of the flow of circulating water to provide for seasonal variation in cooling water temperature is being considered. Such regulation would reduce power required for driving circulating pumps and avoid lowering the condensate to a temperature below that corresponding to the vacuum.

In plants whose supply of raw water is not fit for boiler feed, particular attention should be paid to condenser leakage. Where leakage is likely to be dangerous, such expedients as expanding the tubes into one or both tube sheets or using double tubes with an intermediate draining space have been proposed or adopted.

In boilers there is a tendency toward larger sizes,

higher pressure and higher superheat, although 300 to 350 lb. and total temperatures of 600 to 650 deg. seem to be as high as boiler designers are willing to go at present. The continued high cost of economizers has led boiler manufacturers to develop a boiler with a higher tube bank to get at least part of the saving which could be realized with an economizer.

Improvements have been made during the year in soot-blowing equipment, which while not entirely satisfactory is generally recognized as a necessary adjunct to the modern boiler.

On horizontal-tube boilers there is a marked tendency toward the use of baffles inclined at an angle of less than 90 deg. to the tubes. This plan is readily adaptable to furnace space requirements and desired flue-gas velocities.

The larger boiler units and the higher peak ratings with consequent fluctuations in rate of steaming are giving turbine manufacturers some concern because of fluctuations in superheat and consequent fluctuations in temperature of turbine parts. Several superheater manufacturers, anticipating this difficulty, are working on the design of separately fired superheaters.

The excessive cost of high-grade coal and consequent necessity for utilizing low-grade coal have forced manufacturers of stokers to adapt designs to meet new conditions. The successful application of forced draft to chain-grate conveyor-type stokers opens up to this type a field heretofore pre-empted by the underfeed stoker.

The packing and arching-over of coal in stoker hoppers can be practically eliminated by the use of power-operated agitators installed at the base of the hopper. On the principle that the supply of coal and air is proportional to the rate of steam, several manufacturers are offering systems which control stoker speeds and the speeds of fans and other auxiliaries, through a master controller actuated by differences in steam velocities. None of these systems has been in service long enough to justify unqualified indorsement.

ECONOMIZERS AND OTHER POWER-PLANT AUXILIARIES

As to economizers, partially offsetting their high cost at present are such other considerations as excessive coal prices, high flue-gas temperatures and the improvements in economizers and fans. Relatively few changes have been made in the design of cast-iron economizers, but manufacturers of steel-tube economizers report many new developments. Considerable interest is being shown in the wrought-steel type on account of the higher boiler pressures now in use or contemplated.

Corrosion, internal and external, is the most serious problem confronting the operator of economizer equipment. It is generally agreed that where trouble is being experienced from internal corrosion some method must be used for freeing the air of dissolved gases. The remedy for external corrosion of tubes is to raise the temperature of the inlet water to the point where condensation of moisture does not take place under conditions of steady operation. Economizer leakage is another matter that requires care, especially in design and construction.

The most economical methods of maintaining heat balance in the larger stations are the house turbines in combination with a heater condenser and the straight electric drive with bleeding of the main units for feed water heating. The use of a house turbine lowers the

cost of auxiliary switching equipment and reduces short-circuit current on auxiliary circuits. In general, American manufacturers of feed pumps limit pressure to 100 lb. per stage, although one is now building a single-stage pump, and in England a single-stage high pressure pump has been built for pressures around 400 lb. One pump manufacturer reports the installation of a complete plant for testing pumps with hot water under service conditions. This is a step in the right direction and should lead to beneficial results.

Practically no trouble was experienced from spontaneous combustion in coal piles during the past year, largely because coal stocks were low. As regards coal-crushing apparatus, some members of the association feel the manufacturers have developed crushers of large capacity at the sacrifice of uniformity of product. A decrease in peripheral speed of rolls would probably remedy this to some extent. Automatic coal samplers have not met with entire success on account of the difficulty of securing a representative sample.

Disposal of ashes by sluicing appears to be gaining in favor. A combination of sluicing troughs and sand pumps was reported from one plant.

LINE WELDS MUST BE MADE CAREFULLY

A few years ago line welds were considered advisable in station piping to reduce the number of flange joints, but experience gained since indicates that they may be dangerously weak unless carefully made. There are several types of butt-weld joints in which the welds are reinforced with sleeves. Such joints have proved amply strong.

As to valves, practically all stations using steam above 200 lb. have standardized on steel-body gate valves with complete monel metal trim. Both hydraulically and electrically operated valves are being extensively used, a preference being shown for the electrically operated valve with the Dean type of control. Considerable experience has developed from leaking safety valves, often due to the carrying of the weight of the bent piping on the valve body. In many cases this can be overcome by installing a slip joint close to the valve outlets.

It is hoped that a standardized color code for identifying the several types of power plant piping can be agreed upon as a result of the committee's activity along this line.

The development of new types of boiler and turbine room instruments during the past year is promising. New instruments offered by manufacturers include: (1) Recording pyrometers for indicating boiler furnace temperature; (2) combined CO₂ and CO recorders; (3) multiple-type draft gages; (4) flow meters for indicating small rates of flow of liquids under pressure, such as bearing oil or jacket water; (5) meters based on the principle of the alternating-current potentiometer for detecting condenser leakage.

EVAPORATOR EQUIPMENT ENTIRELY SUCCESSFUL

On the subject of feed water purification, a questionnaire to member companies operating evaporators for feed purification indicated that evaporator equipment is successful and provides pure water at reasonable cost. The internal use of any substances in boilers seems to be coming into general disfavor. In general it will be found more satisfactory to treat the water in a separate treating apparatus.

Developments in the field of pulverized fuel indicate a continued interest on the part of engineers in this

method of burning coal. The Milwaukee Electric Railway & Light Company recently put into operation the new Lakeside plant, which will have an ultimate capacity of 200,000 kw. and which is designed for burning pulverized fuel.

Eliminating the restrictions imposed by the layout of old stations in changing over from grates or stokers to pulverized fuel equipment, the question of high boiler ratings does not seem serious. Such ratings are being obtained in new plants where boilers have ample combustion space and are designed expressly for burning pulverized fuel. The whole question of burning fuel efficiently is in process of solution and no one can foresee the ultimate end.

With respect to the burning of fuels other than coal, the committee report gives a number of suggestions regarding oil and gas burning. The burning of oil for power generation involves two economic considerations. Oil is used where it is the most efficient source of heat because of the absence of an adequate supply of cheaper fuel. It is used where such use affords a means of consuming an excess accumulation of crude oil, residues or distillates for which no other market is available.

Brake-Rod Testing

Breakage in Service of This Important Link in the Brake Rigging Is Made Improbable by the Testing of All Rods to Three Times the Stress to Which They Are Ordinarily Subjected

THE Washington Railway & Electric Company had two serious accidents due to breaking of air-brake pull rods, and it became necessary to give very close study to the condition and strength of the rods with a view to preventing a repetition of such occurrences. At first a test was made on all cars of the system by running the air pressure (which ordinarily is 70 lb.) up to 120 lb. and then, while the brakes were rigidly applied, rapping the brake rods sharply the whole length with a 2-lb. hammer. Several faulty rods were thus found and broken. The causes of the breaking were found to be crystallized metal, poor material and, in a few cases, improper welds. None of these causes could be located by a close inspection, as some of the welds looked perfectly good, but when broken showed the weld to be only 25 to 50 per cent good, and the poor material or crystallization showed up only when the rods were broken.

In deciding on improvements the first thing was to get some good, dependable steel for making new rods, and after several tests electric furnace steel was decided upon. This was found to be tough, ductile and easily welded. One of the tests made was to bend a piece double while cold and put it under the hammer.

The ordinary machine or soft steel which the railway had been using fractured under this test, but no amount of hammering would make the electric steel show the slightest sign of a fracture. In making new pull rods great care is taken in making welds and the metal is allowed to cool very slowly. Every completed rod before installation is put through a tension test in the special machine shown in the accompanying illustration, which was made in the company's shops for the purpose.

A separate air compressor and tank for this testing outfit were installed as the railway did not want to use the shop air line on account of the uncertainty of the

air pressure being just what was wanted, namely, 100 lb. per square inch. The tank is small so as to allow the full pressure to be pumped up quickly and at the same time is large enough so when air is applied to the cylinder it does not appreciably lower the pressure.

The cylinder is 10 in. in diameter and the leverage is arranged to give 8,000 lb. pull on the brake rod under test, which is more than three times what the rod will get in service. The base to which one end of rod under test is fastened is made of two 50-lb. T-rails each 15 ft. long. The whole length of the web of these rails is drilled with $1\frac{1}{8}$ -in. holes to allow a 1-in. pin to be easily slipped through. The two rails are rigidly bolted together with the edges of the base



ONLY GOOD BRAKE RODS PASS THE TEST

touching, leaving a space between the ball of the rails in which a large link can be slipped and held in place with the pin. This link has a short chain, with shackle fastened to it, which is used to fasten the brake rod at that end. The other end of the brake rod is fastened to the cylinder lever. Brake rods up to 12 ft. in length can be tested on the machine. The piping between the air tank and the brake cylinder is as large as possible. An ordinary straight air brake valve is used to apply the air which is admitted directly to the brake cylinder.

The brake rod when under stress is rapped sharply with a hand-hammer, so as to show up any weak portions. In case a brake rod breaks under this test, a stop is provided which catches the lever, and a port in the side of the cylinder releases the air when the piston comes out beyond what it would under ordinary conditions. The pull rods on all cars passing through the general repair shops are tested on this device, and several defective ones have been found that would otherwise very likely have broken down in service and caused serious delays if not accidents.

N. Y. E. R. A. Meets at Lake George

The One Day's Session Was Devoted to Discussions on One-Man Car Operation and Taxation—Two Prepared Papers Were Presented—W. O. Wood Was Elected President for the Ensuing Year

ONE-MAN car operation and taxation occupied the attention of 250 members and guests at the thirty-ninth annual meeting of the New York Electric Railway Association, held in the Fort William Henry Hotel at Lake George on June 11. President T. C. Cherry, in speaking in his official capacity, referred first to a statement in President Harding's inaugural address that the war had left various burdens, and then listed the specific burdens which the war had left on the electric railway industry. These were: Increased floating debts, deferred maintenance, labor contracts covering unreasonably high wages, labor contracts containing burdensome working conditions, contracts for material at abnormally high costs, large investment in materials and supplies on hand, a demand for necessary capital expenditures, and loss of credit.

Fundamentally, Mr. Cherry said, electric railway transportation is a legitimate, sound business, but at present, while it is still legitimate, it is not sound, and the operators are confronted with the problem of restoring the industry to its par value. Nevertheless, it seemed to him that in the last two years the public mind has become more favorable to the industry. Instances have occurred where the city council has offered no objection to a fare higher than that stated in the franchise. This condition has been accomplished by educational work performed by operating men.

Mr. Cherry thought that the phrase "efficient operation" had been overworked. He suggested as a substitute the phrase "honest operation" and said that the manager who can effect intelligent economy in operation is performing his part in restoring the industry to its par value. Such a man can meet the employees of his property, the patrons of his road and the stockholders of his company without excuses.

Secretary-Treasurer William F. Stanton read a report covering the membership and financial situation showing the association to be in a flourishing condition in both respects.

ONE-MAN CAR OPERATION DISCUSSION PROVES STIMULATING

The introductory paper on one-man car operation was read by W. G. Gove, superintendent of equipment Brooklyn Rapid Transit Company. It is abstracted elsewhere in this issue. He was followed by W. H. Burke, Stone & Webster, Boston, Mass. Mr. Burke's paper appears in abstract on another page.



PRESIDENTIAL GROUP AT LAKE GEORGE CONVENTION
Left to right: W. H. Collins, T. C. Cherry, J. F. Hamilton,
H. B. Weatherwax and W. O. Wood.

R. B. Stearns, vice-president and general manager of the former Bay State System, who was present by invitation, traced the history of the application of one-man operation on that property. He credited it largely with the recent local improvement in financial status. This property was formed of seventy or more original railways covering a territory roughly 100 by 40 miles in extent and having 940 miles of track, of which 187 has been discontinued as unprofitable. Changing conditions, including the spread of the

automobile, turned it from a profitable to a non-paying property, until in 1916 operating expenses took nearly or quite the entire revenue. Economies were about to be inaugurated when the company went into receivership. Later the property was acquired at a foreclosure sale by the Eastern Massachusetts Street Railway.

The State Legislature, finally appreciating the necessity for preserving electric railway service, passed legislation permitting operation by State trustees, having comprehensive powers. Taking advantage of the opportunity thus afforded, the public trustees were able to secure some money, which was partly spent in applying one-man operation. Safety cars were purchased and old cars were remodeled, a large amount of worthless rolling-stock being destroyed.

Service with the new cars was inaugurated in the spring of 1920 and by the close of the year 250 cars were in use. In the summer of 1920 400 double-truck cars had been converted for one-man operation, and they were put into commission as soon as the labor situation warranted. Men who had operated the small cars picked the large ones when privileged to do so under the seniority rule, indicating a satisfactory attitude toward them.

Starting with the operation of these cars in September, 1920, the company rapidly increased the number in use until today 93 per cent of all of the service operated on the system is one-man; 54 per cent with double-truck and 39 per cent with Birney cars. The remaining 7 per cent comprises two-man, double-truck cars, most of which will permanently require two men for various reasons including use in two-car trains. The system is now practically "saturated" as far as one-man operation is concerned. The Birney cars weigh, with track scraper, 16,500 lb. All of the company's one-man cars have been equipped, at a cost of \$80 per car, with a device for making an emergency safety stop, as is required in Massachusetts. None of these devices, as far as known, has been used by a passenger to date.

As to one-man-operation savings, Mr. Stearns said that these amount to \$1,250,000 per annum. The energy saving of 16,000,000 kw.-hr. with the small cars, with coal at \$10 per ton, is \$240,000 and the labor saving \$400,000. This is about \$2,500 per car, in addition to savings in track and equipment maintenance. The large cars save \$600,000 yearly. The total number of men on the payroll is now 2,400 as compared with 4,700 or more a year ago. Of the difference between the present and former operating staffs, 1,300 or more represent trainmen.

The safety cars are giving good service under widely varying conditions, former schedules are being maintained, and two-man operation is an almost forgotten idea. No difficulty is experienced with fare collection in zoned territory. The safety cars are averaging 31,000 car-miles per annum and the large cars on special runs or in tripper service 20,000 car-miles.

Mr. Stearns also spoke of the labor and fare situations on his property, which have been covered in recent issues of this paper.

ONE-MAN SERVICE ON SECOND AVENUE RAILROAD

Charles E. Chalmers, receiver Second Avenue Railroad, New York City, who has been operating this property for more than a year, told of his efforts to meet high costs by remodeling cars and operating them with one man on the East Side in that city. Having no money wherewith to purchase safety cars he is making over double-truck cars as described in a recent issue of the *ELECTRIC RAILWAY JOURNAL*.

As the property comprises lines operating through districts with foreign-born populations there was at first some uncertainty as to the result. The first four cars were made for either one-man or two-man operation, but as they proved popular as one-man cars later practice has been to make them straight one-man cars at a cost of \$315.30 per car. This cost will be saved in one year through accident reduction alone. The Second Avenue line was first equipped and for the first five months of the year showed earning power practically equal to the two-man cars on First Avenue even when the popular open summer cars were used on the latter. Selecting a day at random, Mr. Chalmers found on June 2 that the one-man cars took in \$35.97 each and the two-man cars \$34.62. The present plan is to change 100 open cars to a convertible type for all year one-man service. The one-man cars are faster, also.

With average wages of 62 cents per hour on the one-man and 57 cents on the two-man cars and a ten-hour day, the former saves \$364 per day for fifty cars with night service or \$133,152 per year.

Karl A. Simmon, Westinghouse Electric & Manufacturing Company, the next speaker, said the present single-end standard safety car weighs 15,300 lb. and the double-end car 15,800 lb. One great advantage of the standard safety car is that it can use standard equipment, and the history of the safety car motor shows that it has been manufactured in its present form for about five years, which is a fairly long time for a motor.

Changes in motor design mean changes in the machinery for manufacturing motors, and frequent changes increase the cost of manufacture. Where protection against cold weather has been introduced in the car, its weight has got up to about 17,000 lb.

Up to the time that the weight of the car did not exceed 16,000 lb. it was what might be called a "uni-

versal" car; that is, it could be used under almost any conditions of grade, etc. Above that weight the motors might be overloaded under arduous conditions of grade, acceleration, etc., as the motor capacity would then be less than 6½ hp. per ton. The weight in different forms of transportation, per passenger carried, varies from nothing, with walking, to about 2,200 lb. per passenger seat in a Pullman car. Within these two limits will be found the most economical weight.

George H. Tontrup, National Safety Car & Equipment Company, St. Louis, said that car standardization means not only a cheaper car but that the companies could more easily finance their car purchases. It had been shown that a light car can be built as strong as a heavy car. The very early safety cars weighed less than 13,000 lb. and they are still in good operating condition. If the railway companies want to make changes in the present standard car they should decide what changes they want and then standardize on those changes.

J. C. Thirlwall, General Electric Company, said that in the addresses of Mr. Gove, Mr. Burke and Mr. Stearns the delegates had heard from the users of about one-fourth of all of the safety cars in the country and they had testified to its success. The car is now recognized as being suitable even to very congested streets in large cities, as on lower Fulton Street in Brooklyn. Mr. Stearns was pioneering with the one-man car for interurban use. The speaker then gave the facts about safety-car interurban service on the Cincinnati, Milford and Blanchester Railway, described in the issue of this paper for May 28. He told about the system of fare collection on the line, which has twenty-two zones, and said that in the four months the system has been in operation there has been no over-riding, so far as the company knows. He said he had asked the car operators if the system of fare collection used had delayed them in the operation of the cars and they had replied that it had not and they preferred it, as they were "not bothered by conductors." One-man car operation of interurban cars was in about the same status now as city operation was three or four years ago, but the speaker saw no reason why one-man cars could not be used on interurban roads, unless possibly on the most heavy routes. He urged the use of safety devices on the cars if for no other reason than to satisfy the public. He also urged the use of a light car for its reduction on power consumption and declared that on the Cincinnati line mentioned the power saving was considered as great as the labor saving. This condition of affairs would be apt to occur on other interurban lines.

DISCUSSION ON TAXATION

Ralph R. Rumery, consulting engineer of New York, then described the development of the last few years in taxation of the electric railway companies in New York State. He said that the principal state taxes were local taxes on real estate and the special franchise tax. The division of the money received from the state income tax among the various tax districts upon the basis of the assessed valuation of real property in each tax district provides an incentive to the local taxing body to increase local assessments. Certain firms of engineers are circularizing the state offering their services toward increasing corporation assessments, taking a percentage of such increases as their fee. In view of this situation, the companies should be prepared

to offer evidence as to proper assessment figures. Where the local assessments of corporation property are obviously too high, he urged that the figures be brought to the attention of the Bureau of Equalization of the State Tax Commission. This bureau has a corps of engineers whose duties are to assist in the correct valuation of property subject to local assessments.

There is a movement now, he said, to substitute for the special franchise tax a tax on gross earnings, which would bear with special severity on those companies with high gross but low net receipts. Moreover, the speaker said the history of gross earnings taxes was usually a gradual increase in the percentage of the tax. In conclusion he urged greater care in calculating depreciation for inventories. He said that most companies used the straight line method and referred to numerous instances where this method had given incorrect results.

H. C. Hopson, specialist in utilities, certified public accountant, etc., New York, said that there was a great variation in the policies in the different states in regard to taxation of public utilities, particularly electric railways. This fact should be borne in mind in any comparison of wages paid or fares charged, because with taxes as high as they are at present the amount of taxes to be paid has a marked effect on the fare which must be charged and on the ability to pay wages. He listed the taxes which the electric railway companies of New York have to pay as follows: State taxes: State, county and real estate city tax; tax on special franchise; gross earnings tax; tax on dividends amounting to 3 per cent on dividends in excess of 4 per cent; mortgage recording tax. Federal taxes: net income tax on issuance of capital stock. Special taxes: paving transportation tax; tax on interest on mortgage bonds paid on behalf of bondholders to avoid withholding; tax on issuance of capital stock. Special taxes: paving tax.

He declared that if the normal federal income tax should be increased, as is proposed, to say 15 per cent, it would have a serious effect upon the companies. Heretofore they had been but little affected by the federal income tax because of the large proportion of their capital which is made up of bonds. The National Industrial Conference Board had, however, recommended that public utilities should be exempted from increased income tax, but such recommendation had received no consideration by either of the last two Secretaries of the Treasury.

Local taxes, he said, were also becoming more arduous because formerly, with local taxes, a company could argue the merits of its case, but with the present elaborate reports which have to be rendered to the state tax commission and not required from individual property owners, the utility taxes are liable to be higher in proportion to the value of the property than those of other property owners. He urged the companies to appoint a committee on taxation to look up the practice in other states and what proportion of the tax burden other businesses in New York State were bearing. He believed that such a committee would find that the railways were bearing far more than their proportion of taxes. He continued that throughout the state there was a demand for better service, but the companies cannot get money to extend their service if they have to pay anywhere near such taxes as at present. Within the last few years railway taxes have greatly increased not only actually but relatively to gross and net re-

ceipts, although the properties often were decreasing in value. This has been the case notably with the so-called paving tax. At one time the cities believed that it was necessary only to pave the main streets. Now, with existing auto traffic it is thought that many more must be paved, and the time will come soon when practically all streets on which there are tracks will be paved. He cited the case of one road near Buffalo which is fighting to take up its tracks to avoid paying

for paving two-thirds of a highway which will be used exclusively for automobile competition.

In conclusion he urged that so long as the railways remained in their present financial condition, they should give greater attention to accounting statements based on actual receipts and disbursements, instead of confining their attention to operating revenues and expenses, kept as they were on the accrual basis, which, when not considered in connection with other portions of the accounts, often gave an incomplete picture of the financial condition of the property.



SECRETARY
STANTON

In this connection he also urged that the executives and financial officers make a greater effort to educate the operating officials about the financial condition of their property so that the tendencies to demands by municipalities, or recommendations by operating departments for expenditures which the company could not afford, might be more readily checked.

ELECTION OF OFFICERS

At the conclusion of the discussion the following officers were elected:

President, W. O. Wood, president New York & Queens County Traction Company; first vice-president, Benjamin E. Tilton, vice-president and general manager New York State Railways, Syracuse, N. Y.; second vice-president, W. G. Gove, superintendent of equipment Brooklyn Rapid Transit Company. Executive committee: W. J. Harvie, general manager Auburn & Syracuse Electric Railroad; E. J. Dickson, vice-president International Railway; A. E. Reynolds, general manager United Traction Company, Albany, and C. E. Morgan, assistant general manager Brooklyn City Railroad.

After his induction as president Mr. Wood expressed an appreciation of the honor of his election and urged that in the future the association could well take into its inner counsels the manufacturing members and those in professional capacities. The meeting then adjourned.

THE BANQUET

The concluding feature of the meeting was the annual banquet, at which President Cherry was toastmaster. He read some "fake" telegrams purporting to come from men prominent nationally, and then introduced Hon. John A. Barhite, formerly Public Service Commissioner for the Second District, New York State.

Judge Barhite said that he was pleased to be able to address unofficially the men whom he had known through his work as commissioner. The public ideas regarding these men, he said, have changed, and the railway manager is coming to be known no longer as one who is "out to do" the public. One trouble with the railways today,

however, is their failure to insist fully upon enjoying the rights guaranteed them by the Constitution of the United States. They should devote more attention to explaining to the public what these rights are. The people should understand that the idea that the terms of a public service franchise are forever binding is not necessarily true, as there is a power which can change a franchise when constitutional rights are involved. It is too late, said Judge Barhite, to begin educational work when a crisis has arrived, as it is a process requiring time. There should be a constant effort to explain to the public the legal status of the electric railways.

Judge Barhite was followed by Dr. Willard Scott of Boston. His address covered the general theme of contrasts in various aspects of life and was illustrated with numerous witty anecdotes. The serious purpose of the address was to show that changes are inevitable and not necessarily to be deplored, but the problem for the individual to solve is one of adjustment or adaptation.

RAIN COMPLICATES ENTERTAINMENT PROGRAM

Outdoor sports were interfered with by inclement weather, but golf enthusiasts managed to play between showers, and many "conventionites" stayed over the week end. The ladies were well provided for with card games during the meeting, and an excellent orchestra played for dancing and general entertainment. The singing of the Manhattan Quartet during and after the banquet was greatly appreciated.

One-Man Car in Its Present Relation to Operating and Maintenance Costs*

BY W. G. GOVE

Superintendent of Equipment Brooklyn Rapid Transit Company

THE electric railway industry, to a greater degree perhaps than was or is the case in any other line of public utility, has since the period immediately preceding our entry into the recent world war been very generally occupied in trying to "make both ends meet." Operating and maintenance costs have mounted by leaps and bounds, taxes have been considerably increased and other burdens added, and only very recently has it seemed as though the "peak" had been reached. We are in general living in a post-war period of price and cost discussion, and although there has recently been a tendency toward lower price levels for materials entering into the maintenance of our properties, it must be kept in mind that as labor is usually a large part of the cost of producing supplies and equipment the process will be slow, as wages can be reduced only gradually. Four or five years ago most maintenance work could be considered upon a basis of 50 per cent labor and 50 per cent material cost. It has now been distorted more nearly to a 75 per cent labor and 25 per cent material basis. It is therefore obvious that the large and most important item is "labor," and it appears that we will have to face a disproportionate cost in this respect for some time to come, especially in localities where there has been no decrease in wages from the high peaks reached in 1920.

"One-man car operation" is a term with which we have become thoroughly familiar within comparatively recent years. The great step forward came through the introduction of the Birney safety car, approximately six years ago. In its production thorough con-

sideration was given to the possibilities of reduced operating costs and with minimum weight consistent with reasonable strength. Its particularly novel feature was in provision for one-man control on a practical basis.

Its pathway of introduction was by no means easy, having been opposed by railway operators because of its diminutive proportions, by platform men through their unions because of the labor-saving qualities, and by the public because it just did not know. This combination of opposition did not apply in every instance, fortunately.

The foresight of those who devised the means of control, commonly called the safety features, contributed probably the greatest single measure to success, for it must be remembered that in the standard safety car we have a single unit with a uniform method of operation which has successfully met the operating conditions on approximately 250 different railway properties. Aside from this, in practically every instance where opposition to such operation was expressed it was on the basis of safety, and with the safety devices in evidence the opposition was overcome.

Another factor for which we are indebted to the manufacturers allied with our industry, rather than to those actually engaged in operation, is the perpetuation of standards in design. Unfortunately there is in evidence among our various properties an inclination to inject into the details of car design and construction too great a reflection of our personal views as gathered from our own property. As a matter of fact, while we are all producing and selling the same thing—street railway transportation—there was, before the advent of the safety car, practically no two lots of cars ever constructed over the same specifications, and in this practice there must have been a direct charge, for which we are responsible, to cover a tremendous range of development. Now there are in service nearly 5,000 safety cars of a single uniform type and the range of service delivered by them comprises cities of population varying from 20,000 to 2,000,000.

As to economies, it is difficult to express the items in the particular manner which might appeal to you individually. The platform saving is obvious. The track maintenance saving is prominently indicated, although I do not recall any figures on the subject. Boarding and alighting accidents are practically eliminated through the novel method of interlocking doors and steps with air brakes. Power costs are greatly reduced. It has been stated that a single safety car means a direct saving of from \$1,800 to \$2,600 per year, depending on the basis of comparison, and if we may presume an average of \$2,000, it will be seen there is already in action a potential saving of \$10,000,000 per year in our industry. Taken on any basis, the total will prove imposing.

In regard to the subject of relative sizes of cars necessary, I do not recall a single instance in the studies I have made of this subject where, with suitable track facilities, the standard safety car could not meet traffic requirements. The limit of its capacity may be directly ahead, but certainly it has not yet been attained. With the growing movement at hand looking toward the use of large cars under one-man operation, it will be possible to satisfy, at higher cost, the conditions which prohibit use of the small car.

The same principles of uniformity of equipment and operating methods and the same reasons for safety

*Abstract of address at meeting of the New York Electric Railway Association at Lake George, N. Y., June 11, 1921.

devices apply to the conversion of double-truck cars. The need is just as great, the human element equally fallible. Until recently the total number of double and single truck cars converted for one-man operation was about 700, but there has been a very decided increase in such activities, particularly in the East, and it is evident this means of effecting economy will expand greatly. I have within the last two weeks noted with particular interest the introduction of the one-man principle into the interurban service operating out of Cincinnati, Ohio, by means of single-end, double-truck cars, seating forty-seven and equipped with all standard safety devices. This operation is reasonably typical of interurban service.

Whether the rebuilding of existing cars and using existing motors of the older and heavier types is advisable depends to a great extent upon the length of time such larger cars are required for use. If required throughout the entire day the principal factor to be considered is the amount of power that will be consumed by the rebuilt cars due to their weight and larger motors as compared with new cars of the same capacity. These can no doubt be designed and constructed of considerably less weight per passenger capacity, and when equipped with new motors especially designed for the particular service will have a considerably lower power consumption.

A very few operating companies are advocating and one or two have purchased safety cars with an increased length of platform having both an entrance and an exit door. The number of points where both doors may be used to advantage, however, are so few as to make the excessive cost of construction and increased cost of power due to the added weight seem unwarranted.

The surface lines of the Brooklyn Rapid Transit System have had 206 standard Birney safety cars in operation for a year and a half. These are operated on thirty-five different lines with service varying from shuttle service, where but one car is used, to through lines, where a varying number of cars up to a maximum of twenty-one on a line is used. One of these through lines operates on lower Fulton Street in Brooklyn Borough, which is one of the most congested sections in any city in the country. These cars operate without the slightest difficulty and are interspersed with cars of both larger and heavier types at the present time.

When placing these cars in service the headway was changed on but few lines and on these lines it was shortened. With the use of the safety car fare boxes were placed in service, where on cars previously used fares were collected by the conductors. This has resulted in an increase of revenue, attributed in some cases to less stealing and in others to the fact that no fares are missed. The operators of safety cars in Brooklyn are paid an additional 5 cents an hour, so that the saving in platform costs has been on most lines 50 per cent less.

The general attitude of the public regarding the use of safety cars in New York City has been favorable and the attitude of the operators has also been generally satisfactory. No difficulty has been experienced in maintaining schedules even with the additional duration of the stops caused by the use of the safety car where full stops must always be made for both boarding and alighting passengers, where previously the cars used permitted "flying" stops as they were not fully vestibuled.

I have not given any actual data and statistics as to

the weights, speed, power consumption, costs of operating, etc., of the safety car as compared with other types of cars, as no doubt these are known by you, such data having been published in the *ELECTRIC RAILWAY JOURNAL* and other technical publications as well as having been presented in papers that have been read during the past two or three years at the meetings of various railroad clubs.

In concluding, I wish to make plain that, at least to my way of thinking, the development of the "safety car" and the "one-man" principle has been and is one of the most promising fields for economy in our industry today and that the greatest credit is due to C. O. Birney, whose foresight and courage disregarded past practice and prejudice, and to the Stone & Webster corporation, whose faith in Mr. Birney's judgment and financial backing introduced the car first to compete with the jitney in the West and Southwest and later firmly established the car as a regular institution for general use. I also wish to point out that this is a prominent example of what can be done by active co-operation of the manufacturer, the purchaser and the operator in shaping standardization of design, which I referred to in a talk before this association a year ago. It is obvious that more prompt, complete and economical results in determining standards of design, construction and practice can be obtained for the industry than are obtained from committee work that, after all, merely scratches the ground. Members are prolific with advice for determining what others should do, but are often quick to find reasons why they cannot "practice what they preach."

I earnestly recommend to those intrusted with the operating of our properties, both within this state and elsewhere, the prompt, serious consideration of adopting and extending one-man car operation over their lines and not prejudice such as impracticable.

Development of the Safety Car*

BY W. H. BURKE

Stone & Webster, Inc., Boston, Mass.

THE development of the Birney car dates back to the time when the electric railway companies under Stone & Webster management, along with practically every other company in the country, found themselves operating a lot of heavy double-truck cars weighing from 1,000 to 1,500 lb. per seat, and when only half the seats were taken, this meant unit weights of from 2,000 to 3,000 lb. per passenger.

We decided that the companies were losing a great deal of short haul traffic and also longer haul business, which could be secured and profitably handled if it were possible to develop a very light-weight car with which we could afford to operate shorter headways. Then the jitneys came along and the matter was quickly brought to a head.

The first Birney car was a double-end car seating twenty-nine people and weighing 13,000 lb., or only 450 lb. per seat. Since then, a few minor changes in design have been made. The latest design of double-end car seats thirty-two and weighs about 15,300 lb., or 480 lb. per seat. The single-end car weighs 14,500 lb. and seats thirty-five, so that its unit weight is 415 lb. per seat. However, the latest car is the same in substantially all essential details as the first car built.

*Abstract of address at meeting of the New York Electric Railway Association at Lake George, N. Y., June 11, 1921.

Commercial operation of the Birney car was first started in Fort Worth, Tex., on Nov. 1, 1916. On that date the Northern Texas Traction Company replaced all of the two-man equipment on its Summit Avenue line with Birney cars, ten cars having been purchased for this service. By 1919 there were 1,200 of these cars in use in the United States, and by 1920 nearly 4,000. Today there are upward of 5,000 in use.

To a company contemplating one-man operation, two or three factors are of particular interest. Take first the matter of selecting and training operators. The men picked should be enthusiastic; in other words, they must be sold the one-man idea because they will have more to do than any one else in making the Birney car a success. Other requirements are alertness, adaptability and ability to concentrate. Courtesy is a prime requirement, and the men should have had a good record in two-man service. We have never followed the seniority rule in picking Birney car operators, and our experience has been that it makes little or no difference whether a man has previously been a motorman or a conductor provided he measures up to the requirements mentioned.

Here, briefly, is the plan adopted by one of our companies about a year and a half ago for training platform men, and it has worked out very satisfactorily. This company has about ninety one-man cars, 130 other city cars and forty-five interurban cars. We will assume that the man has come through the preliminaries and is reporting to an instructor to break in. For the first day he observes operation of a Birney car on the instructor's regular run. The next day they take a Birney car out on some outlying line where they won't interfere with traffic, and the student becomes familiar with the mechanical and electrical features, and learns to operate the car in a preliminary way; this covers starting, stopping, getting and keeping the car under control, taking switches, etc. This requires from three to five days.

The student next learns to operate the car on the instructor's run, and then is transferred to two-man tripper service. He first operates on the same end with the instructor and later operates each end with the instructor taking the other end. This continues until he has covered practically every city line. In this way he learns the various schedules, streets, transfer points, etc., and in fact gets a good idea of the system as a whole. Then he is O.K.'d for work, but the instructor still keeps in touch with him and helps him in every way possible.

The average breaking-in time under this plan has been 210 hours, the longest being 355 hours and the shortest 135. Under the plan formerly in force, the average time was a third longer and the man was not instructed nearly as completely as he is now. As for the older men, motormen and conductors, the company devoted two weeks last summer to breaking them in on Birney cars. Not one was disqualified by his instructor, and in only two or three cases did they quit of their own accord. This means that every platform man in this company's employ is a three-way man: he can operate a Birney car and either end of a two-man car and can do it on any line in the city. Furthermore, the matter of runs and the extra list problem are greatly simplified, and only one regular and one extra board are required for the city service.

The highest type of supervision and instruction is necessary in introducing the one-man operation, and the

shop force should be instructed in maintaining the safety equipment. Usually a representative of the manufacturers will attend to this if desired. And here I want to say a word of appreciation of Mr. Beck of the Westinghouse Company and Mr. Thirlwall of the General Electric Company. They have contributed greatly to the success of the Birney car, and the industry owes them a unanimous vote of thanks.

As to the introduction of the car to the public, it is important, of course, to start it off with its best foot forward. Neither the public nor labor should get the idea that the company wants to hog all the advantages. Our companies have always shared the savings with the man through somewhat higher wages, and with the public in the way of better service.

We have never made it a practice to start one-man operation with anything but new cars of the standard Birney type. We feel that the service should be materially improved at first, except possibly in the largest cities on lines where the headways are already very short. Too much service is better than too little for a time, because it is service more than anything else that sells the car to the public. Above all, the Birney car should not be regularly overloaded. If it is, the public gets the idea that the company isn't "toting fair," and this causes dissatisfaction.

There was some labor opposition in the early days, because the men had the idea that the introduction of the Birney car meant that half of them would lose their jobs. It doesn't work out this way, of course, because the increased number of Birneys operated and the normal labor turnover will usually take care of this. In fact, I don't know of a single case where any of our companies has been forced arbitrarily to discharge any men as the result of one-man operation.

The psychology of the local public is a factor in introducing the car, and possible objections should be anticipated and met in advance as far as possible. We have found newspaper advertising of value, but believe it should be concentrated into two or three days before operation is begun. Otherwise, if there are any dissenters, it gives them just so much more time to formulate objections. Once the car is properly introduced it is its own best advertisement, and, practically without exception, we have found the press comments favorable. Some of the press comment is usually along humorous lines, and that helps, because so long as you can keep the public laughing you won't have much trouble.

As to the economics of the Birney car, the savings are very substantial. Without exception, I believe, we have found that with shorter headways earnings have shown a very substantial increase. Here are a few typical cases of the relation between increased earnings and increased mileage for a few of our companies:

	Per Cent Increase in Mileage	Per Cent Increase in Earnings
Tampa—one line.....	29	13
Tampa—one line.....	51	51
El Paso—one line.....	48	50
El Paso—one line.....	40	36
Houston (heavy jitney competition).....	70	40
Tacoma—one line.....	20	25
Tacoma—one line.....	75	42
Tacoma—one line.....	3	17

We feel that it is very conservative to assume an increase in earnings and mileage at the ratio of 1:2, that is, with 30 per cent more mileage we will get 15 per cent more gross. No increase would be expected, of course, where headways are two or three minutes with

two-man cars and, therefore, short enough to get all the business there is.

The most obvious savings in expense are in platform labor and power. There is also a saving in maintenance, but until the Birney car is older it is impossible to say definitely what it will be in the long run.

There is a marked reduction in accidents in substantially all cases; step accidents are virtually eliminated. An analysis of our companies for the first five months of 1920 show the following results:

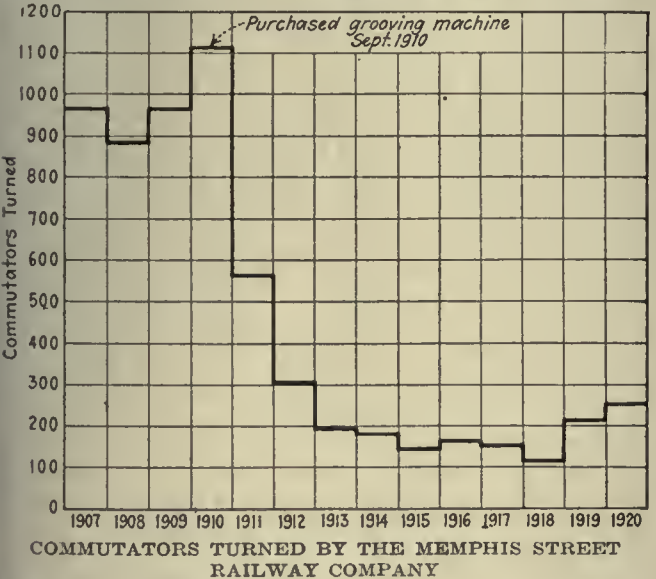
	One-Man	Two-Man
Car-miles operated per accident.....	18,100	10,800
Passengers carried per accident.....	88,700	73,800
Paid out in settlements for each 1,000 car-miles operated..	\$10.60	\$15.00

As a broad proposition I think you can figure conservatively on a saving of not less than \$2,500 per car per year with Birneys on a car for car exchange, and with a third more service, and the increased earnings which result the saving in net is around \$3,500 per year for each Birney car purchased.

As regards the remodeling of existing equipment, we are now operating 100 rebuilt cars, quite a percentage being double truck. With Birney operation well established, we have found no objections on the part of any one to the use of rebuilt cars, and we feel that the operation of double-truck one-man cars has tremendous possibilities. After all, the step from single- to double-truck one-man operation is not as radical as the original change from two-man to Birney cars. In general, we believe that no valid objection can be raised to rebuilding double-truck cars for one-man operation if safety devices which are standard for the Birney car are used.

Slotting Increases Life of Commutators

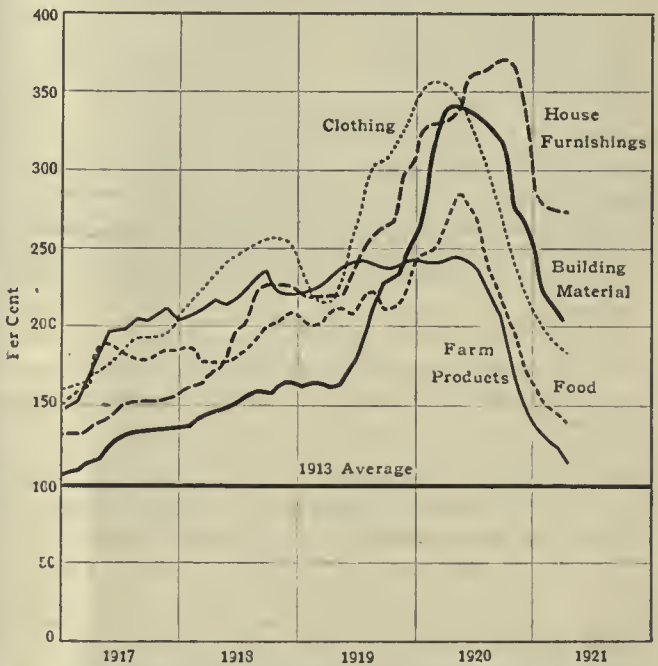
THE effect of commutator slotting in reducing the number that it is necessary to turn for flat spots, rough surfaces, etc., is very foreefully illustrated by the accompanying graph showing the number of commutators turned by the Memphis Street Railway Company. This company purchased a General Electric



Company's commutator slotter in 1911 and began the work of slotting the commutators of all armatures. During the year 1911, 1,115 commutators were turned. The sudden drop in the graph after this year is very noticeable and in the year 1918 but 115 commutators were turned.

Cost of Living Chart

THE monthly review of the Federal Reserve Bank of New York for June 1 presents a series of interesting charts of prices, including the one reproduced, which shows wholesale prices of certain groups of com-



WHOLESALE PRICES OF CERTAIN GROUPS OF COMMODITIES IN THE UNITED STATES EXPRESSED AS PERCENTAGE OF THE AVERAGE FIGURES FOR 1913

modities in the United States, expressed in percentages of the average figures for 1913. Another chart shows wholesale commodity prices in the United States and England from 1790 to date. The United States figures have three peaks, namely, about 1814, 1865 and 1920, all approximately the same height.

Retail Prices of Foodstuffs Still Falling

THE United States Department of Labor through the Bureau of Labor Statistics has given out the changes in retail prices of food in nine principal cities of the United States. These changes are based on the prices of forty-three articles of food. During the month ended May 15, 1921, the retail cost of food in Bridgeport decreased 3 per cent; in Newark, 6 per cent; in New Haven, 5 per cent; in New York, 4 per cent; in Norfolk, 4 per cent; in Philadelphia, 5 per cent; in Providence, 3 per cent; in St. Paul, 8 per cent; and in Washington, 5 per cent.

For the year ended May 15, 1921, the decrease was 29 per cent in Bridgeport; 30 per cent in Newark; 31 per cent in New Haven; 29 per cent in New York; 30 per cent in Norfolk; 32 per cent in Philadelphia; 30 per cent in Providence; 37 per cent in St. Paul; and 29 per cent in Washington. For the eight-year period May 15, 1913, to May 15, 1921, the retail cost of food shows an increase of 39 per cent in Newark; 43 per cent in New Haven; 49 per cent in New York; 51 per cent in Providence; 44 per cent in Philadelphia; and 53 per cent in Washington.

The Bureau of Standards has recently issued its miscellaneous publication No. 46, describing the war work the Bureau of Standards.

Trackless Trolley Tested at Schenectady

Successful Demonstration of First Vehicle Built for the Virginia Railway & Power Company—Bus Has Seating Capacity Equivalent to the One-Man Safety Car

A DEMONSTRATION of the trackless trolley bus was given June 15 at the Schenectady plant of the General Electric Company, where a two-wire overhead system for the operation of this type of car was strung up over a route of about $\frac{1}{2}$ mile. There were more than one hundred railway officials present to witness and participate in the demonstration, which caused much comment. The "Trollibus" operated throughout the day over a highway route having several kinds of paving, namely, brick, macadam and ordinary dirt and cinder road. The tests were declared in every respect successful. After the morning demonstration the party adjourned to the Mohawk Club, where a buffet luncheon was served.

The trackless trolley bus resembles in general size and appearance the present one-man single-truck safety car and seats thirty passengers. The equipment consists of a single railway motor and a controller arranged for foot operation. Two overhead wires on 14-in. centers supply the current, which is taken into the car by a sliding type collector, maneuvered by the motorman from his seat, and allows a leeway of 18 ft., or 9 ft. on each side, for passing other vehicles.

This arrangement allows two cars to operate in opposite directions on the same wire; on meeting, the operator can swing off to the side, disengage the collector or trolley pole and, after the other car has passed, can reconnect it with the trolley wire and proceed.

When running over the track area of the system; that is, in returning to the carhouse, the trolley bus is equipped with an adapter on the collector for connection with the standard overhead trolley wire and a shoe which fits into the track groove, thus giving the necessary ground connection.

The chief advantage of the trackless over the regular trolley system is the low initial capital investment. To install a single-track trolley line on an unpaved



AT LEFT, OPERATOR'S COMPARTMENT, SHOWING OPERATING AND TROLLEY CONTROL MECHANISM; AT RIGHT, INTERIOR OF TROLLEY BUS, SHOWING SEATING ARRANGEMENT AND FINISH

street costs about \$35,000 per mile. On a paved street, where the railway company is forced to pay for the pavement between the rails and 2 ft. outside, the cost jumps to \$75,000 per mile. The overhead trolley distribution system for a single trolley line costs approximately \$4,500 per mile, and where a double set of trolley wires is strung the cost will be about \$5,500 per mile.

As compared with the gasoline-driven motor bus the operating and maintenance cost is said to be much cheaper. From the standpoint of the rider, it is also claimed, it provides a service of equal reliability and comfort, and in many cases the operation is faster and smoother, especially where the streets are well paved and maintained. According to statistics given out by the General Electric Company, that portion of operating costs for gasoline and lubricating oil of the motor bus averages 5 cents per mile, whereas with the trackless trolley the cost of electricity is but 2 cents a mile. The maintenance of equipment, including tires, averages 9.5 cents per mile for the motor bus, as compared with 4 cents for the trackless trolley. Depreciation on the gasoline bus averages 3.4 cents per mile as compared with 1.9 cents for the trackless trolley. The saving in favor of the trackless trolley is therefore 10 cents per bus-mile. Figuring that the average bus runs 33,000 miles per year, this means a saving of \$3,300. The first cost of a trackless trolley installation is higher than a gasoline bus, due to the overhead construction required. Interest, depreciation and taxes on this investment reduces the annual savings from \$3,300 to from \$2,500 to \$2,700 per bus in service.

Following the tests at Schenectady a large installation is expected at Richmond, Va. Installations are also expected to be made at Staten Island, New York, Buffalo, N. Y., and other cities.

Trackless trolley cars have been in successful operation in some European countries for several years. One hundred miles of trackless system is in use in England, and in Italy several companies are operating over 40 miles of route.

Cars of this type are not new to the United States, but at present none is, so far as can be learned, in use. The general purpose of this car is not to supplant or take the place of the ordinary rail system for the business districts or thickly settled sections of a city, but to make it possible to operate trolley cars in suburban sections where the cost of laying and maintaining rails and ties would make the extension of lines impracticable.



GENERAL VIEW OF TROLLEY BUS, MOUNTED ON SOLID RUBBER CATERPILLAR TIRES



EXTERIOR VIEW OF REBUILT CAR



INTERIOR OF CAR, SHOWING SEATING ARRANGEMENT

Little Rock Joins in Rebuilding Cars

Old Summer Cars Are Made Available for All-Year Round Service—Increased Safety of Inclosed Cars Is a Factor Entering Into the Decision to Rebuild

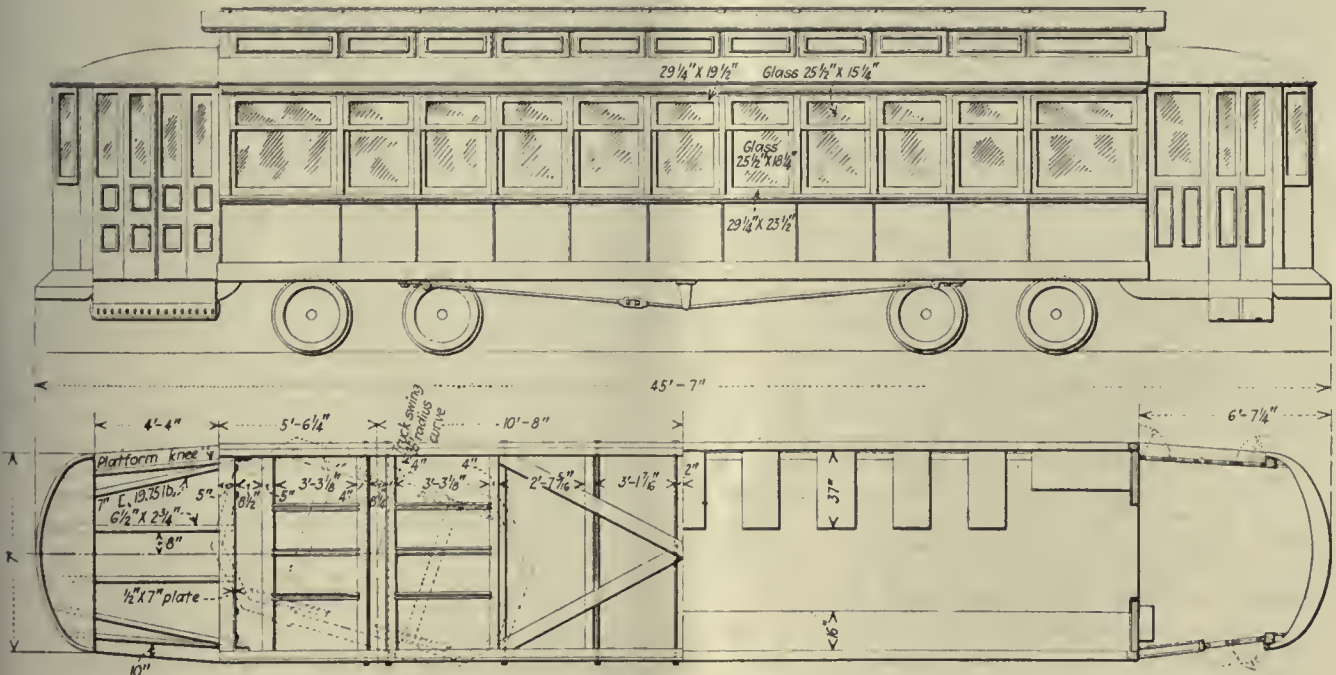
THE Little Rock Railway & Electric Company has joined the movement of inclosing some of its summer cars in order to make them available for all-year round service. While some railway men who live in northern climes probably imagine that Arkansas is in the sunny South, where open cars may be used eight or nine months a year, the fact is that four months' service is about all that can be obtained from open equipment in that part of the country. Also, the Little Rock Railway & Electric Company has on an intensive and continuous safety campaign and it was decided that closed cars were very much safer than open cars; this was one element which entered into the decision to inclose some of these cars.

The cars which were chosen to be rebuilt were six fourteen-bench side running board cars which had been on hand for some time. Everything above the floor level was torn out except the sills and roof. The cars were cut off at the corner posts and new platforms were

put on; these were 6-ft. platforms, drop extension. An accompanying illustration shows the supporting structure for these platforms. The old posts were built up by the addition of necessary strips to take care of windows and inside finish. The windows were arranged to raise and not to lower; that is, the window of the type usual on railroad coaches was designed and built in the shop of the company.

The original cars seated seventy on the fourteen cross benches. The present car seats forty-eight only. The body was too narrow to put full cross seats on both sides, so a seating arrangement using both cross seats and longitudinal seats was adopted, as shown in the accompanying illustrations. The longitudinal seats were built in the shops of the company, but Hale & Kilburn cross seats were purchased and used. The cars were completely curtained by the Curtain Supply Company.

The original floor in the car was left, with the strips removed, and a 4-in. pine floor laid on top of the old. Strips were placed in the aisle as usual. Twenty-gage galvanized iron was used to line the car below the window sill. Sheet iron was used on the outside. The entire car, both inside and outside, is enameled. The



PLAN AND ELEVATION OF REBUILT CAR

Little Rock Railway & Electric Company has decided that enamel is the thing to use as it lasts satisfactorily in that part of the country for three years, takes less time to apply and gives general satisfaction. The experience with paint and varnish there has shown that varnish must be applied annually to keep up the finish. As a matter of fact, it is figured that there is a 50 per cent saving in painting by the use of enamel over the ordinary paint and varnish. The color used is yellow, which has superseded the former pullman green of the company which was found to change to black after a short time in service.

The cars are equipped with four GE-57 motors, K-35 control, and Brill 27-G 1 trucks. Ohio brass air sanders were added as equipment to the car, as was also Ohio brass air brake equipment. National pneumatic doors and steps are used, manually operated. It was necessary, in order to provide the required room on the platform, to provide the hand brakes with folding handles, which were obtained from the Dayton Manufacturing Company. Ten heaters, arranged on two circuits, were installed in each car. The heaters used were No. 192 manufactured by the Consolidated Car Heating Company.

These cars were 42 ft. 8 in. long originally, and as rebuilt are 45 ft. 7 in. long.

The total cost of rebuilding these cars per car was \$3,000. This work was done between Sept. 15, 1920, and Jan. 15, 1921.

Characteristics of Oxyacetylene Welding and Cutting Blowpipes

THE result of an elaborate series of tests tried out by R. F. Johnston, engineer-physicist, U. S. Bureau of Standards, Washington, D. C., for the War Department on commercial apparatus for cutting and welding by the oxyacetylene process form the basis of an article in the May issue of *Mechanical Engineering*. The tests were conducted for the War Department on apparatus submitted by manufacturers for that purpose.

The general conclusions from the tests were that there was a great deal of difference between the characteristics of different designs of cutting blowpipes and that there was no make of apparatus which was equally proficient and economical for all thicknesses of metal. Further, one of the prime essentials of a good welding blowpipe is its so-called gas ratio, which should be unity. Not any of the blowpipes tested proved capable of maintaining a gas ratio of unity during welding, although the welds were probably made with greater care than is usually exercised when such work is being done.

The important problem of "flashback" received extensive consideration. A blowpipe designed to be absolutely free from flashback caused by any form of obstruction, under all working conditions, will also be the eminently safe blowpipe and the one which, with ordinary care, will produce sound welds. Such a blowpipe will be so designed that, under all conditions of operation, even to a complete blocking of the gas exit at the tip end, there will be maintained a one-to-one volume delivery of each gas at identical pressures. Of the blowpipes tested, it was noted that those which were especially susceptible to flashback were the ones in which the oxygen was delivered to the blowpipe at a pressure very much in excess of that at which the acetylene was delivered.

An Inexpensive Air Hoist

Discarded 7-In. Brake Cylinders Are Used in the Brass Foundry of the Union Traction Company of Indiana for Constructing a Hoist to Lift Crucibles of Molten Metal from the Furnace to the Foundry Floor

BY J. E. HESTER

Master Mechanic Union Traction Company of Indiana

THE accompanying illustration shows an air hoist constructed of four 7-in. brake cylinders and other second-hand material taken from used material stock and from the scrap pile. This is in use in the brass foundry of the Union Traction Company of Indiana and is used for handling molten metal from the furnace to the molds. In constructing this hoist the brake



HOME-MADE AIR HOIST

cylinders were lined up by fitting soft wood blocks into the ends of the cylinders. The wood blocks were 7 in. in diameter, 2 in. thick and were slightly tapered from the center to both ends. A 3-in. hole was bored in the center of the blocks to facilitate their removal after lining up and before the heads were put in place. The cylinders are bolted together with four $\frac{1}{2}$ -in. rods threaded at both ends to receive the necessary nuts; $\frac{1}{8}$ -in. sheet asbestos was used as gaskets at the joints between the cylinders, and to guard against the cylinders getting out of line the joints were welded with an oxyacetylene torch. The pressure head used consisted of an old discarded steam cylinder head, which was machined to fit the lower end of the cylinder. This was provided with a stuffing box and the packing gland was made from an old discarded gland.

The piston consists of a head threaded to receive the lifting rod which extends through the piston and is fastened with a $1\frac{1}{2}$ -in. nut, which takes the strain and prevents the stripping of the threads in the head. The lifting hook used was secured from an old discarded pair of chain falls.

In the construction of the crane itself the upright member was made from a piece of old 60-lb. rail and the arm was made by bolting two pieces of $\frac{1}{2}$ -in. x 3-in. x 3-in. angle iron with $\frac{3}{4}$ -in. x 2-in. iron spacers placed 1 ft. apart. The arm of the crane is supported 8 ft. from the floor by means of a piece of $\frac{1}{2}$ -in. x 4-in. x 4-in. angle bolted to the upright. The arm is trussed to the top of the upright member by a $\frac{3}{4}$ -in. rod, which is

provided with a turnbuckle. The pivot bearing at the base of the crane was made from an old discarded car center bearing, the flanges of the male portion being machined off and riveted to the upright member by means of two angle irons and the female member of the bearing being bolted to the foundry floor.

The traveler which carries the hoist consists of two sides with pins from old motor suspension bolts. The wheels used were old coal conveyor wheels bored out and babbitted where they bear on the pins.

The air used to operate the hoist is secured from a Westinghouse steam-driven air compressor located in the central power station near the shops. The air line is connected to the hoist by means of a $\frac{3}{4}$ -in. hose which allows the hoist to be moved the entire length of the crane arm. The air is controlled by a two-way valve.

A New Theory of Rail Corrugation

IN RECENT issues of *Verkehrstechnik*, published in Berlin, Germany, appeared an extended article by A. Wichert of Mannheim on the subject of rail corrugation. In this he describes and discusses a new theory which he has evolved and tested experimentally. Before doing so he summarizes the theories which he found in the literature on the subject as follows: (1) The development of corrugation is favored by lack of homogeneity in the rail material due to irregularities in the rolling process; (2) corrugations are hammered into the rails under the action of rhythmical jumping of the wheels; (3) corrugations are caused by vertical vibrations of the rail; (4) corrugations are caused by "sliding vibrations" of the wheels, dampened by friction, which occur within certain critical speeds.

The new theory is based upon the setting up of "friction vibrations" which are of frequent occurrence in daily life. The action of a violin string under the bow, the creaking of a door, the sound caused by rubbing a finger along a wet window pane, the squeaking noise of wheels in a curve or of brake shoes on wheels, all involve noises caused by vibrations, due to rhythmical change in coefficient of friction. According to Mr. Wichert's theory, corrugation of rails is due to these vibrations set up under sliding of the wheels on the rails, involving change in friction coefficient, which is maximum when two surfaces in contact are at rest with respect to each other and falls off rapidly as they move with respect to each other. A factor is also the elasticity of the car axle, which acts like a spring.

Mr. Wichert explains that under actual conditions friction vibration will occur only when the wheels are sliding, as, for example, when a heavy train is starting, during braking, when a car is on a curve, etc. At the points where the wheels slide, a crowding of the material of the rail takes place, followed by the ordinary wear due to rolling. This causes a rhythmical change in the surface of the rail. Tests have, in Mr. Wichert's opinion, proved that the crests of the corrugation are considerably harder than the depressions.

The lower and upper limits of speed at which corrugations are liable to be formed are respectively about $7\frac{1}{2}$ and $17\frac{1}{2}$ m.p.h. If it were possible to determine the factors controlling the speed limits, it should be possible to alter them by modifying the factors. Mr. Wichert therefore takes up the matter of preventing rail corrugation. According to his theory the upper speed limit is set by the cessation of rhythmical gliding. If, therefore, an absolutely rigid, non-elastic axle were used.

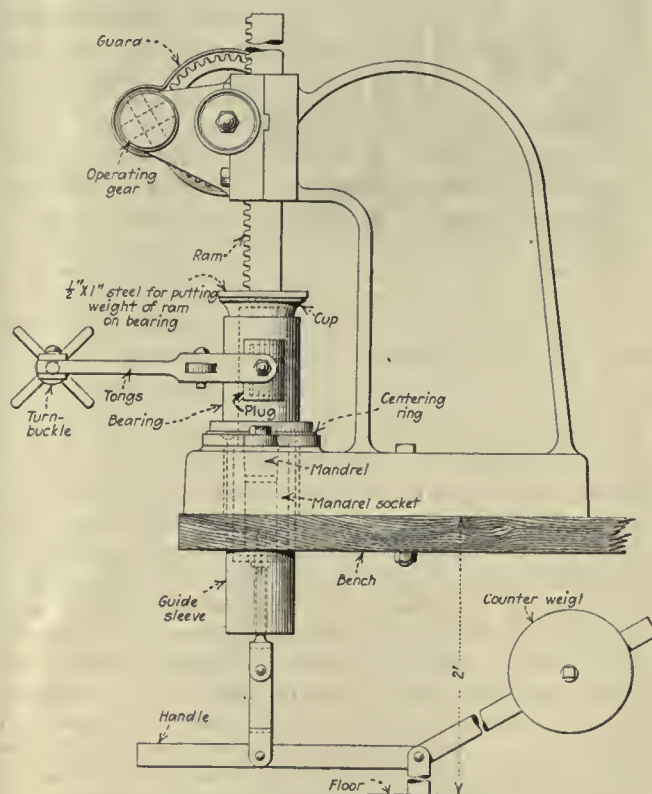
the upper limit would be at zero speed. Obviously then increase in diameter of axle should prevent friction vibrations and corrugations. Calculations and experiments show that axles 4.75 in. for a gage of 39.4 in. (1 meter), and 5.5 in. for standard gage should materially reduce the formation of corrugations. An elastic bedding of rails and ties is another safe way to cut down the possibility of developing friction vibrations. Experience has proved, Mr. Wichert says, that concreted tracks have a tendency to develop corrugations on account of their rigid foundation.

Mr. Wichert was able to check his theory experimentally by means of a special testing machine with which rail corrugations could be produced at will. It consisted of two axles, with wheels, mounted one above the other. The wheels of the upper pair were of the standard flanged type and were driven by a railway motor. The lower set, representing the rails, had special tires of rail cross-section. The lower wheels were pressed against the upper and rotated by friction with the latter. By means of levers, weights and springs the two sets of wheels could be pressed together and driven in a manner to imitate actual running road conditions.

New Armature Bearing Babbitting Press

ACCOMPANYING illustrations show a new type of armature bearing babbitting press, which is being marketed by the Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y. This press is a modification of the well known type of arbor press used in machine shops quite generally, differing only in that it is geared for a ratio of $3\frac{1}{2}$ to 1 in order to provide increased pressure necessary for this particular purpose.

Some of the advantages which result from the use of this press in babbitting armature bearings are that as the mandrels, centering rings, pouring cups and other

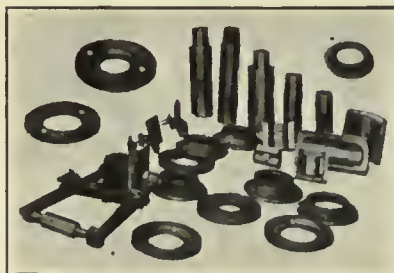


ARMATURE BEARING BABBITTING PRESS

devices necessary in babbitting are a part of this machine, much time and labor are saved in that the bearing is the only part which requires handling. The press and the mold are combined, so that the babbit lining can be poured into the small space between the mandrel and the bearing with more accuracy than with the usual hand method.

The various operations necessary in babbitting an armature bearing with the aid of this press consist of putting the mandrel in its lowered position and the bearing in place in the centering ring, with the flanged end down. The mandrel can then be raised until

stopped by the shoulder of the mandrel socket. The cup, really a pouring funnel, provided to facilitate the pouring, can then be placed on top of the bearing. A strip of steel approximately $\frac{1}{2}$ in. x $1\frac{1}{4}$ in. should then be laid across the top edge of the cup and the ram brought down on this with light pressure on the handle bar. The plugs for closing the openings or windows in the bearing form a part of the tongs used for handling the bearing. These can be quickly placed in position and insure that the opening will be clean and smooth so as to require no further attention after the bearing is poured. After the babbit lining has been poured in the space between the mandrel and the bearing, the ram is



PRESS IN POSITION WITH THE VARIOUS DETAIL PARTS PROVIDED WITH THE OUTFIT

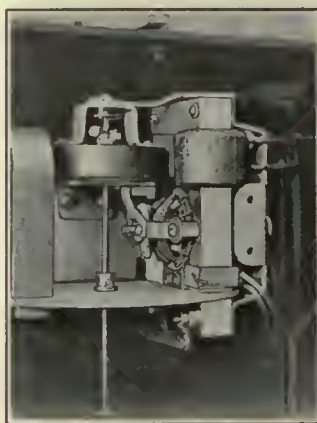
raised just high enough to remove the cup and then is lowered to force the mandrel down until free. A 2 or 3-in. movement is sufficient as the mandrel has a slight taper. The additional movement required can be done rapidly by means of the counterweight lever. The counterweight provided overbalances the weight of the mandrel so that it will stay normally in the up position. In the using of this press bearings should be thoroughly cleaned and tinned, of course, and both the bearing and the mandrel must be heated sufficiently so that the babbit will not chill before reaching the bottom of the bearing. The press was designed primarily for babbitting electric railway armature bearings, but can be used for other purposes where considerable force is required, such as the forcing of bearings in and out of housings. Its capacity is 12,000 lb.

New Kilovolt-Ampere Meter

AN INSTRUMENT of the induction type, for measuring kilovolt-amperes, has been put on the market by the Esterline-Angus Company, Indianapolis, Ind. The instrument will ultimately be available in graphic, integrating, indicating and interval-demand types, but the graphic type has been developed first.

The measuring element of the new instrument is about the size of the element of a polyphase wattmeter. Each single-phase element consists of a pair of laminated poles carrying exciting windings, between which is pivoted a small armature. The armature maintains a fixed phase relation between the voltage windings.

The scale is uniformly divided throughout, and the instrument is said to be equally accurate throughout the entire range of power factor from unity to zero, either leading or lagging current. The meter records the true



NEW GRAPHIC KILOVOLT-AMPERE DEMAND METER—MEASURING ELEMENT OF KILOVOLT-AMPERES DEMAND METER

kilovolt-amperes of the circuit, regardless of the degree of unbalance. The three-phase instrument indicates the sum of the products of current per phase times corresponding voltage to neutral, which is the true kilovolt-amperes of a three-phase circuit.

New Type Hand Brake

THE Minich Railway Appliance Corporation, Philadelphia, Pa., is marketing the Super-Safety Hand Brake, which consists of a vertical staff supported by a special cage. This cage is threaded to fit a nut supported by slots in this cage, so that it will move vertically. There are lugs on opposite sides of the nut which operate a U-shaped lever. A connection bar which takes the place of the usual brake chain is attached to this lever and to the brake rod. Round lugs are provided on opposite sides of the cage as a fulcrum for the U lever, so that when the staff is revolved and the nut raised the lever will revolve on these lugs and thus pull up and apply the brakes.

The fulcrum of the U lever is changed gradually as the brakes are applied, so that the power is comparatively low at the beginning, permitting the slack to be taken up quickly, but is increased toward the end of the application. Pawls are unnecessary to keep the brake applied. Some of the advantages claimed for this type of brake are that the ratchet wheel, plate, pawl, brake chain, staff, yoke and similar parts are eliminated, and as all stresses on the staff are vertical, this can be made shorter and lighter.

Letter to the Editors

“Get the Young Engineer While the Getting Is Good”

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA., June 11, 1921.

To the Editors:

The editorial which appeared in the *ELECTRIC RAILWAY JOURNAL* on June 4, 1921, under the caption of “Get the Young Engineer While the Getting Is Good,” together with the article on page 1041 entitled “Master Mechanic Proves His Worth,” aroused a great deal of appreciative interest among engineers here who are interested in the development and progress of electric traction.

It is becoming quite generally recognized that there are two especially important positions on the operating staff of each reasonably sized street railway company. They are that of the master mechanic, who has charge of maintenance and upkeep of rolling stock, and that of the transportation man, who is in charge of making up and planning schedules. Either one of these men is in a position, to use the slang of the street, to make or break the railroad, assuming that other managerial problems are solved to a reasonable degree.

The article on page 1041, which demonstrates that a master mechanic proves his worth, in reality proves a very old saying, namely, “As the boss is, so are the men.” If the boss is a good mechanic and instinctively is satisfied only with good mechanical workmanship, is naturally tidy and orderly in his habits and knows how to encourage and get the best out of men working with him, naturally he will keep the cars and equipment in reliable working condition at the same or lower cost than the man who is not.

To a great many men who have been in a position to observe the operating and maintenance positions as they exist and who have tried to analyze the causes and reasons why cars and equipment are not maintained better, irrespective of the pressure and necessity for reduced costs and limited pay rolls, etc., the answer seems to lie in the lack of appreciation on the part of many administrative officers of the importance and economy of paying the right kind of a salary to attract the right kind of a master mechanic. Another reason is that the industry as a whole has so neglected this phase of its problem that men have not been developed very rapidly and, as a result, very few men are available who measure up to the job of master mechanic. Another reason, perhaps, is the general lack of interest on the part of administrative officers in the matter of encouragement and personal attention to the master mechanics, the repair shop and its problems. It is in only a small percentage of street railways that the administrative officers have shown the proper interest in the shop and its problems by making frequent visits, by holding conferences with the master mechanic and considering him an important officer in the organization. There are a great many properties where the master mechanic is not called in to attend the weekly or monthly conferences of the operating staff and, as a result, there is frequently a wide difference of opinion between the transportation department and the mechanical department which results in friction, lack of co-operation, etc.

This, of course, is not true on the well-managed and well-conducted properties. It might be stated that the apparent attitude of mind toward maintenance of equipment in general on the part of many executives is about the same as it used to be a few years ago on the matter of publicity, the development of favorable public opinion, etc. The latter, however, happy to say, has undergone a decided change. Today, without doubt, there is not an administrative officer on any railway who is not alive to the necessity and importance of proper organization to handle publicity continually for the purpose of developing public good will not only among the people in the community served but also among the employees. It seems, therefore, only necessary to continue the good work you are doing in the pages of the *ELECTRIC RAILWAY JOURNAL* toward arousing proper interest in the matter of engineering analyses and better mechanical workmanship and general maintenance of railway equipment because, after all, there is no factor so great as that of reliable and regular service with properly maintained cars and equipment in developing and maintaining the good will of the public. Large sums spent on publicity and literature will be rendered void and negative if they are not backed up by reliable and decent service, which your article on the “master mechanic” proves can be accomplished with the right man in charge of this work.

Recently a very prominent manufacturing engineer was discussing the matter of greater refinement in the mechanical construction of locomotives, taking the position that you could not get American maintenance staffs to follow the same degree of accuracy in workmanship and maintenance as that which obtains on many European properties. In order to prove this point he asked the question, “Why is it that although every master mechanic and operating officer on electric railways knows positively that if axles, axle caps and axle bearings and housings on railway motors were properly maintained the cars would make less noise by proper maintenance of gear centers, wear and tear on gears would be appreciably less and the vibration would be reduced to a marked degree and, finally, the maintenance of the entire car and equipment would be appreciably lower, yet there are only one or two roads in the whole United States that actually do this?” It was quite difficult to answer this question. The apparent reason seems to be that they have not had any definite example proving that this is so and in the absence of the necessary spare equipment in many cases have not been able to get the cars necessary to carry out such work. Furthermore, in most cases the master mechanic is not provided with a staff capable of making any such analyses.

This brings us up to the editorial which you have written, which suggests that they get the young engineer while the getting is good. This suggestion is very timely and a very important one.

It is very encouraging to note that quite a number of young engineers who became available for such work as a result of the industrial depression have been taken over by the progressive railway operators. It is further very encouraging to have been able to see one or two reports made by these young engineers showing the errors in maintenance and upkeep that they have discovered during the first month or two of their experience. It was quite clear that the one or two things that they had already discovered would more than pay for their expense during the entire year.

As previously mentioned, it seems only necessary to agitate this subject sufficiently until all railway operators become impressed with the great value and necessity of having a well trained, technically educated—either self-educated or from college—man as a member of their operating and maintenance staff. The title of "efficiency engineer" is taboo. Most railways have called them "transportation engineers" or "equipment engineers." But their job is the important thing. It is to study transportation schedules, etc., from an engineering point of view and also to study the cars and equipment or the tools the railroad has to provide such schedules and service, making analyses each day of operating costs and time-table costs and making suggestions each month in writing to the manager of the property.

It will, of course, be necessary for the operating managers to be somewhat indulgent with these engineers for a time and go to the necessary expense to make certain tests. For example, on the question of value of maintenance of gear centers, axle bearings, etc., several cars on a given line should be specially equipped for test and then operating records should be kept for six or seven months in order to prove the value of such maintenance practice. Again, consider the matter of dipping and baking armatures and field coils. This was first introduced several years ago, but it took time to convince a great many that the expense necessary to carry this out was justified. Today there is hardly an up-to-date road that is not following this practice.

There are actually a thousand and one things of an engineering nature that can be carried out on each road which, when once established, will save thousands of dollars annually and, above all, provide better and more reliable service to the public. This, after all, is the very best publicity in which a railway operating company can indulge.

MYLES B. LAMBERT,

Manager Railway Department.

Association News

Report of Equipment Committee Put Into Shape

A TWO-DAY session of the equipment committee of the Engineering Association was held at the association headquarters in New York City, June 13 and 14. The various subcommittees presented final reports with recommendations for consideration and discussion and various details were decided for including in the final report of the committee. Those present were Daniel Durie, West Penn Railways, chairman; W. S. Adams, J. G. Brill Company; R. H. Dalgleish, Capital Traction Company; James C. C. Holding, Midvale Steel & Ordnance Company; H. A. Johnson, Metropolitan West Side Elevated Railway; T. R. Langan, Westinghouse Electric & Manufacturing Company; C. N. Pittenger, the Steubenville, East Liverpool & Beaver Valley Traction Company; E. D. Priest, General Electric Company; C. F. Scott, General Electric Company; K. A. Simmon, Westinghouse Electric & Manufacturing Company, and C. W. Squier, ELECTRIC RAILWAY JOURNAL. The committee will report on twelve subjects and already a large amount of work has been accomplished.

Schedule Committee Meets

THERE was a well-attended meeting of the joint committee on the economics of schedules at association headquarters on Wednesday, June 15. The reports of three special committees were submitted and approved. The first, covering the definition of man-hours and car-hours, was presented by Mr. Stoll; the second on variable running time, by Mr. Moser, and the third on methods of improving handling of traffic in congested centers, by Mr. Sullivan. It was agreed that the final draft of the report should be prepared by Mr. Dana and presented to the executive committee by July 1. It was also agreed that the full report should be presented in abstract form, only, at the convention, in order to permit greater opportunity for discussion. The names of the leaders of the discussion will be determined at an early date.

The following were in attendance: J. V. Sullivan, sponsor, Chicago Surface Lines; Edward Dana, Boston Elevated Railway, chairman; H. C. Moser, Fifth Avenue Coach Company, New York City; J. A. Stoll, United Railways & Electric Company, Baltimore; Samuel Riddle, Louisville Railway; Donald Goodrich, Twin City Rapid Transit Company, Minneapolis; A. G. Neal, Washington Railway & Electric Company; J. M. Campbell, Atlantic City & Shore Railroad, and H. A. Otis, Chicago & Interurban Traction Company.

State Utility Information Bureau Work Discussed

WITH a view to establishing closer co-operation between the State Committee on Public Utility Information and the Advertising Section of the Division of Information and Service of the American Electric Railway Association, the directors of nine state committees and Labert St. Clair of the Advertising Section conferred in Chicago on Wednesday, June 1.

It was agreed that in the future copies of all information furnished on request by the advertising section to any of the various state directors would also be sent to all of the others. The state directors also agreed to submit immediately a series of questions on their local railway problems to the association's advertising section for answer. Such answers will be distributed to all.

Mr. St. Clair reiterated previous assurances that all information regarding the electric railway industry which the association has, or which it can obtain, is at the disposal of the state committees without charge. He also explained the plan of news distribution by the Advertising Section, making it clear that the section does not concern itself with supplying material to strictly local sources, but rather with seeing that news of national importance reaches the hands of the large press associations and the larger dailies. The directors of the state committees, he emphasized, are on a preferred mailing list of the Advertising Section and every attempt is made to avoid duplication of efforts.

H. M. Davis, director of the Nebraska committee, told interestingly of his efforts to bring about closer relations between the public utility managers and the newspaper publishers in his state. He said that in the last year he had visited virtually every town in Nebraska and urged public utility managers to use display advertising space for such of their material as was not of news value. As a result of his efforts, he declared, the utilities of Nebraska spent \$118,000 in display space last year.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Detroit Conferences Renewed

Fare and Purchase Questions Considered at Meeting at Which New Spirit Prevails

Following the demand of Mayor Couzens that a new fare schedule of ten tickets for 50 cents or a 6-cent cash fare be put into effect on the city lines of the Detroit United Railway, it was announced that Allen F. Edwards, vice-president of the company, and Alex Dow, newly elected director, would confer on the matter with the Eastern bankers who are interested in the company. It has been indicated by Mr. Dow that the 5-cent fare will be adopted if it is possible for the company to operate on that basis. It is understood, however, that the arrangement would be temporary pending the revision of the accounting system of the company so as to obviate the wide variance between the company and the city on figures.

At the same time the matter will be taken up with the New York men interested relative to arriving at a satisfactory price for the lines which the city plans to take over under the day-to-day agreement. These lines approximate 25 miles in length.

The Mayor's demand upon the company followed a conference of city officials with Mr. Edwards and Mr. Dow at which the engineers for the company and the city were present. The letter from Mr. Edwards in which he agreed to confer with the Mayor stated that he "hoped for a full and satisfactory discussion of the fare question." This was termed by the Mayor the most friendly communication yet received from the company.

It is held that since the reduction in wages of employees put into effect by the company on May 1 the necessity for the higher fares has passed. Action on the original injunction is asked and also an order designating the value of the rebate slips which have been issued by the company with each strip of tickets sold since the high rate was allowed. The fixing of a time limit for the public in redeeming the rebate slips is also asked.

The appraisal of the lines to be purchased by the city by city's representatives has been completed and the city auditors have also gone over the cost to the company for the lines. Only tentative figures have been arrived at and there is a wide divergence between the city and the Detroit United Railway figures on the matter of depreciation to be charged off. The city appraisers figure depreciation at 24.25 per cent. The company figures it at 5.40 per cent. Following the first con-

ference it was announced that a further meeting would be held after the company had been allowed an opportunity to study the figures furnished by the city's appraisers. A compromise on the percentage of depreciation to be allowed is expected to result.

Arbitrators Cut Interurban Wages

Arbitrators in the wage dispute between the Cleveland, Painesville & Eastern Traction Company and the company's trainmen have decided that the men will have to accept a reduction in pay to 43 cents an hour for the first three months' service; 45 cents an hour for the next nine months, and 48 cents an hour for men in service for more than a year. The men have been receiving 55 cents, 58 cents and 60 cents an hour. Thus the men are called upon by the arbitrators to accept the offer made to them by the company.

The three arbitrators, Charles Spaulding, Painesville; Charles Currie, Cleveland and Akron, and S. D. Hutchins, Columbus, in their report said an exhaustive investigation led them to conclude that the cost of living had dropped to such an extent as to make the wage reduction justifiable. The decision also fixes the same wage for trainmen employed by the Cleveland, Southwestern & Columbus Railway as the men on this road had voted to abide by the decree of the Cleveland, Painesville & Eastern Traction Company arbitrators. The award for the Cleveland-Southwestern men is retroactive to May 1.

Arbitration in Favor of Men

The arbitration board considering the wage dispute between the Wheeling (W. Va.) Traction company and its employees has decided the scale shall not be changed for another year. The men refused to accept a proposal for a 10 per cent cut in wages made by the company. Numerous conferences were held in an effort to effect a settlement without resort to arbitration, but these being unavailing the company selected R. D. Jennison, a former executive of the Elm Grove lines, as its representative on the board. The employees authorized Thomas Kady of McMechen, a well-known labor leader, to act for them. After two or three informal meetings these two chose the Rev. R. E. L. Strider of St. Matthew's Episcopal Church as the third and neutral arbitrator. The scale which now continues for another year is as follows: For the first three months 53 cents an hour, next nine months 58 cents and after one year 61 cents.

Franchise Revision Advanced

Only Minor Details Remain to Be Arranged at Cincinnati—Fare Reduction Prospects Good

With the exception of certain minor details every demand made by the officials of the city has been conceded by the Cincinnati (Ohio) Traction Company in a redraft of an ordinance modifying the railway franchise. The minor details will probably be adjusted at a conference to be held soon and the ordinance approved so that it can be presented to the City Council for action. A public hearing on the modifications to be made in the franchise is being arranged by the Council committee on street railroads.

Under the terms of the modified ordinance the city will agree to a deferment of the payment of the franchise tax until after Jan. 1. This is merely a technicality, since the company cannot be compelled, under the terms of the existing franchise to pay the tax until it has been earned. The tax has not been earned for the year 1920 nor for the first six months of the current year and is carried on the books of the company as a deficit.

The ordinance as modified provides, however, that all surplus earnings of the company must be paid into the city treasury each quarter, beginning April 1, 1921, and must be applied to the liquidation of the back tax due to the city. There is a stipulation that the company will be permitted to defer payments into the reserve fund until the rate of fare has fallen below 7½ cents.

The franchise requires the company to create a reserve fund of \$650,000. Of this amount \$250,000 has been paid into the fund of the company. If the provisions of the existing franchise are insisted upon, it was said, there could be no reduction in fares until the franchise tax has been earned by the company and further until the reserve fund of \$650,000 had been completed. A clause in the modified ordinance provides that if the rates of fares are not reduced on Aug. 1 and Nov. 1 the ordinance becomes null and void and the conditions of the existing franchise again become operative.

The modified ordinance further provides that children under ten years as now will be conveyed for one-half the regular rate. All children of the public and parochial schools, however, between the ages of ten and eighteen years, are to be conveyed to and from school for 5 cents.

It was announced that in order that the car riders may avail themselves of the reduced fares by Aug. 1 it will be

necessary to pass the ordinance within the next ten days. Because of the referendum law the measure will not become effective until thirty days after it is signed by the Mayor and this will be just in time to permit the company to announce a reduction fifteen days before it will be operative, as is provided for by the terms of the franchise.

Amicable Agreement in Cooperstown

A new agreement was recently entered into between officials of the Southern New York Power & Railway Corporation, Cooperstown, N. Y., and a committee representing the Amalgamated Association without taking the wage matter to arbitration. The principal difference between this year's and last year's contract is that the highest rate was reduced from 45 cents to 40 cents an hour and time and one-half for overtime on the freight runs was eliminated.

The wages to be paid motormen and conductors for the next year will be as follows:

First six months—35 cents an hour.
Second six months—37 cents an hour.
Second year's service—39 cents an hour.
After second year's service—40 cents an hour.
Freight trains—2 cents additional.
Helpers—5 cents an hour under the hourly rate.
Snowplow motormen and conductors—47 cents an hour.
Operators of one-man cars—5 cents an hour over the passenger rates.

In the new contract the established policy of the company to maintain an open shop will be strictly adhered to, which means in the terms of the contract, that "each individual employee is left free to exercise his own discretion as to whether he will join a union or not." A section in the agreement allows for arbitration in the event of dispute between the company and its employees. The agreement will remain in force until June 1, 1922.

Wage Cost Must Be Reduced

W. H. Boyce, general manager of the Beaver Valley Traction Company, New Brighton, Pa., recently sent out a notice to his trainmen asking them to help out in the present extremity—to assume a part of the \$93,000 loss which faces the company for the coming year. He tells the men in his circular of the various wage reductions throughout the country, and also reminds them of the company's generosity during the past three years when the men needed help in view of the increase in living costs. He adds further that it would seem that since the first of the year foodstuffs in the vicinity have decreased nearly 40 per cent and the company is asking hardly a third of that in wage reductions.

The Beaver Valley traction officials have met at various times with committees representing the men for a wage adjustment. The matter has now come to a head and the men will either have to accept the reduction, which amounts to about 7 cents an hour, or place the matter in the hands of disinterested arbitrators.

St. Louis' New Wage Contract

Old Men Continued at Former Pay—
New Men Get Less—Other Conditions Modified Substantially

A new wage contract has been agreed upon by the receiver of the United Railways, St. Louis, and the carmen's union (Amalgamated) though the details especially in regard to working conditions have not been drafted finally. The entire matter must be passed upon by the United States District Court. After this has been done a digest of the terms of the agreement will be made public.

The old three-year contract expired on June 1, and the new agreement is retroactive from that date. The new contract is to run only until Jan. 1, 1922, and the pay of trainmen who were in the employ of the company on June 1 is not affected, these rates being 55 cents the first year, 60 cents an hour the second year and 65 cents the third year and thereafter. Under the new agreement new employees are to draw 50 cents an hour the first year, 55 cents the second year, 60 cents the third year, and 65 cents an hour the fourth year and thereafter.

Other employees in the carmen's union, except trainmen, were cut approximately 5 cents an hour—car placers from 48½ to 43½ cents, car cleaners from 44½ to 39½, while trackmen who were getting 49½ are to get 42; others who were getting 48 are to get 41, and some who were drawing 44 cents now are to get 35 cents an hour.

Radical modifications have been made in the working conditions in the interest of the management. Extra men called on to work are to receive pay for five hours minimum instead of eight as heretofore, and if a man is assigned to complete a regular run when a regular man gets off before completing the run the motorman or conductor who completes the run is to get only straight hourly time instead of eight hours pay as formerly, and the regular man will be allowed pay only for the actual time he puts in. The maximum time for regular runs is set at nine hours and the minimum eight hours, with 15 minutes allowed for pulling out and pulling in. Instead of time and a half for overtime as heretofore time and a quarter will be allowed.

An important clause in the new agreement is that there shall be no arbitration in cases where conductors are discharged for stealing. These arbitration cases caused considerable annoyance and expense to the management, though there has been arbitra-

tion in only about a dozen instances among the more than 200 cases where men have been discharged for stealing since the receiver took charge of the property two years ago.

Colonel A. T. Perkins, manager for the receiver, assisted by counsel, conducted negotiations for the new contract with Frank O'Shea, one of the international vice-presidents of the union, his lawyer and a committee of trainmen. There are approximately 5,000 members of the local union. At a meeting on June 11, 4,137 of the members voted on the new contract and accepted it, 3,809 to 328. When the drafting of the document is completed this week it will go to the Federal Court.

In limiting the new contract to a period of seven months Colonel Perkins has made it plain to the employees that there will have to be a considerable reduction in pay on Jan. 1 unless the fare is raised from 7 to 8 cents or travel increases greatly. The daily receipts now are running an average of about \$2,500 a day less than they were at this time last year under the same rate of fare.

The question of a fare increase is waiting on the revaluation of the property by the Missouri Public Service Commission. The inventory was completed several months ago after more than three years of labor on the part of the commission's engineers and accountants. A hearing on the finding is set for September. In the meantime the commission is allowing 6 per cent on a tentative valuation of \$50,000,000. The company expects to be able to show that this is away under the true value of the property.

In passing on the wage question Colonel Perkins told the men that there are some who are overpaid, others who are drawing about what they are worth, and still others to whom he would like to pay more money. Inasmuch as injuries and damages are costing the company about \$3,000 a day, it is his theory that a good trainman is worth good pay. Under the new working agreement it will be easier to get rid of the bad ones than it has been in the past.

Voluntary Acceptance of Wage Reduction

Motormen and conductors of the Citizens' Traction Company, Oil City, Pa., voted unanimously on May 18 to accept a wage reduction of 10 cents an hour. The wage scale in cents per hour from Jan. 1, 1917, to June 1, 1921, is shown in the accompanying table.

WAGE SCALE OF EMPLOYEES OF OIL CITY TRACTION COMPANY

Period	1917		1918		1919	1920	1921
	Jan. 1	Aug. 31	March 9	July 31	Sept. 10	April 26	June 1
First six months....	..	..	..	30	41	51	41
Second six months..	..	..	..	34	43	53	43
Third six months...	..	..	..	..	45	55	45
First year.....	24	26	30	..	..	..	..
Second year.....	25	27	32	36	..	One-man op- erator	One-man op- erator
Third year.....	26	28	34	38	..	5c. additional	5c. additional
Fourth year.....	27	29	36	40	..	..	..
Fifth year.....	28	32	..	..	..	..	..
Sixth year.....	30	..	..	..	..	..	..

Relief Program Enacted

Connecticut Legislators Come to Aid of Electric Railways by Carrying Out Governor's Recommendations

The 1921 session of the Connecticut General Assembly, which has just adjourned, was one of signal importance toward improvement of the electric railway situation in the State. Conditions have been distinctly unsatisfactory. With the Hartford & Springfield, the Danbury & Bethel and the Shore Line in the hands of the receivers and the Connecticut Company barely weathering the storm of adverse conditions aggravated by ruinous jitney bus competition, the legislators sat down with the plain evidence before them of a transportation crisis.

GOVERNOR LAKE in his inaugural message gave much attention to the problem and submitted detailed and constructive recommendations which showed his own critical investigation of the subject. He recommended, in brief, relief from the burdensome requirements of bridge construction and pavement costs levied on the trolley companies, rigid regulation of jitney buses and the granting of permission to electric railways to operate motor bus lines as connecting links or feeders to regularly maintained lines. This program was carried out by the Legislature in its entirety besides the enactment of several lesser measures all contributing to the general relief of trolley companies.

Paving requirements were covered in the passage of a bill by which companies were required to pave 8 in. on each side of the rails, making 32 in. for a single track and twice that amount for a double track. The demands heretofore have been 8 ft. 8 in. over all for single track and 19 ft. for double track.

TAX RELIEF MEASURES PASSED

By another act the highway commissioner is empowered to determine what amount electric railways shall pay toward bridge construction. Formerly one-third the cost of construction had been levied on bridges located in towns, and an indefinite contribution toward the cost of those in cities, the sum to be determined by conference and agreement. The matter now rests wholly in the hands of the highway commissioner and the arrangement is regarded as quite satisfactory to all concerned.

On the subject of taxation two important measures were passed. The first reduces the state tax levied on electric railways from 4½ per cent of gross earnings to 3 per cent of gross. A measure to make the levy on net earnings failed of passage because of the improbability of its yielding any revenue to the State. The second taxation bill enacted is designed to enable the electric railways to clean up their back taxes within six years after July 1, 1922. Interest will be charged during these years at the rate of 4½ per cent and after that date at the rate of 8 per cent. A similar arrangement of interest charges was provided in a bill covering the Connecticut Company's indebtedness of \$500,000 to the State for the cost of the Washington Bridge between Milford and Stratford. These

measures are expected to go a long way toward re-establishment of Connecticut street railways on a dividend basis.

Perhaps the greatest single element which has militated against the best interests of efficient and paying trolley service has been the unfair and irresponsible competition of jitney buses, which have made alarming inroads upon the revenue of both rural and urban lines. The Governor dealt with the subject at length in his message and took an uncompromising stand for strict regulation of the jitney. Early in its session the Legislature quickly disposed of the matter by vesting in the Public Utilities Commission the power to regulate the public motor bus as regards routes of travel and to exact responsibilities incumbent upon all common carriers. The jitney problem had been previously dealt with by localities with moderate success, but in this new law authority has been centralized and the matter is in hand. Immediately upon its passage the commission began hearings on the flood of applications for licenses to operate jitney buses here and there in the State but so far it has reserved its decisions in all cases.

Another bill authorizes electric railways to operate motor buses to supplement regular electric service. This is in accordance with the Governor's recommendation. So far the Danbury & Bethel Street Railway has announced its intention of expanding its service by this means; and it is also said that the Connecticut Company has under consideration a plan for supplementary motor service on its Hartford division.

Attention of the law makers was directed to the Shore Line Electric Railway and its difficulties, with the result that legislation was effected which means the restoration of service on at least a part of the system. Measures acted upon were for the incorporation of companies to acquire the property and franchise of the old company for the purpose of operation. What service has been rendered over the system recently, it is understood, has been under lease by the Connecticut Company. Part of the road, the section from New Haven to Saybrook, was sold for junk last fall, but the purchaser was reported by Receiver Robert W. Perkins to have defaulted in his contract and the deal was terminated after some of the track had already been removed.

Labor elements made an effort to get through the Legislature a bill to do

away with the one-man car. It was unsuccessful, the one-man car having pretty well established itself in the various localities where it has been introduced.

Thus that part of the Legislature's business dealing with electric railways is a fulfillment of every recommendation made by the Governor; and further, as in the case of the tax relief bills, it carries out the recommendations made to the General Assembly by the Public Utilities Commission in the report of its inquiry into electric railway conditions as authorized under an act of the 1919 session. The commission's program and that of the Governor coincided largely. The former recommended that electric railways be authorized to abandon non-paying lines, but to this end no legislative action was taken. It had also suggested that no interest be charged on deferred taxes.

Not one of these bills encountered noteworthy opposition. Committees expedited their work, debates were perfunctory and the Legislature's action throughout was characterized by a unanimity of action which pointed to a realization of the urgency of these corrective measures, which now have the Governor's signature.

Franchise Surrendered in Indianapolis

The Indiana Public Service Commission has formally entered on its records that the franchise of the Indianapolis Street Railway has been surrendered. The announcement that the company would surrender its franchise was made on June 3 by Dr. Henry Jameson, president of the board of directors. City officials have understood for some time that such action was contemplated.

Two of the biggest questions resulting from the action of the company are whether the company shall continue to pay its franchise tax of \$30,000 a year, and whether the company shall continue to pave between its tracks as required by the franchise which now no longer exists.

The company has refused to pay its installment of franchise tax due April 1. Under the franchise it had until June 1 in which to make the payment but it continued to refuse. Mr. Ashby has announced his intention to sue for the payment, unless an agreement can be reached. It is the contention of the city that the company should continue to pay the tax, although not legally obligated to do so.

In the matter of paving, the company has been paving between the tracks and maintaining all such pavements. It now proposes that the city shall lay the pavements and the company maintain them. The city contends that the franchise arrangement should continue.

At a conference on June 8 the city and Dr. Jameson stated their respective positions in a general way, the only definite agreement reached being that pending final settlement of the question the company will take orders from the board of public works.

Wages Cut in Salt Lake

Reduction There Averages 12½ per Cent—Saving to Company Estimated at \$125,000

A decision reducing wages of employees of the Utah Light & Traction Company, Salt Lake City, Utah, an average of 12½ per cent was handed down on June 8 by the board of arbitration in the wage controversy between the company and its employees. The awards of the arbitration board and the wages the men were receiving prior to the expiration of their agreement on April 30, 1921, are as follows:

	—Wage per Hour— Old, Cents	New, Cents
Carmen—		
First year	57	50
Thereafter	64	57
Painters—		
First grade	68	59
Second grade	59	50
Helpers	50	41
Carpenters—		
First grade	68	59
Second grade	61	52
Helpers	53	44
Welders—		
First grade	68	59
Second grade	55	46
Helpers	50	41
Blacksmiths—		
First grade	68	59
Hammer men	55	46
Helpers	50	41
Machinists—		
First grade	68	59
Second grade	55	46
Helpers	50	41
Armature winders—		
First grade	68	59
Second grade	55	46
Helpers	50	41
Electrical Department—		
First grade	68	59
Second grade	55	46
Helpers	50	41
Barnmen and pitmen—		
First grade	61	52
Second grade	55	46
Helpers	50	41
Car cleaners	50	41
Welders (nine-hour day)	\$5.65 to \$5.50	
Switch repairers (nine-hour day)	5.25 to 4.50	
Track cleaners greasers and teamsters (nine-hour day)	4.50 to 3.65	
Bonders, railcutters and yardmen (nine-hour day)	4.50 to 3.65	
Trackmen, first six months (nine-hour day)	4.50 to 3.25	
Trackmen thereafter (nine-hour day)		3.65

The decrease is approximately one-half of what was asked by the officials of the company, and ranges from a decrease of 11 per cent to 18.9 per cent. The decision will reduce the annual payroll of the company approximately \$125,000.

The award is retroactive to May 1, 1921. It will be included as a part of the working agreement between the company and its employees for the year ending April 30, 1922. The award is in the nature of a compromise by which both the company and the employees have agreed to abide.

The wage dispute arose early in April, when the company gave notice that it desired to reduce wages when the next annual working agreement with employees went into effect on May 1. The employees opposed the reduction, and both sides agreed to place the matter before an arbitration board for settlement.

The board has been in executive session since June 3. For a week prior to that time a public hearing was held

and testimony from both sides was received by the board.

In the opinion of the members of the board of arbitrators the differential between regular and temporary track employees will enable the company to do more of the much-needed work on city pavements with the money set aside by it for maintenance and repairs.

Chicago Bills Still Pending

With only five days more left of the current session the Illinois State Legislature took a recess on June 11 having before it several important measures affecting the Chicago traction companies and other utilities.

Mayor Thompson's bill for the formation of a "transportation district" and a 5-cent fare was passed by the lower House and sent to the Senate.

The new utilities act had been in the Senate for several days and had been burdened with amendments until it did

not much resemble its original form. It looks as though both measures were booked for some rough sledding, with the final outcome uncertain.

Owing to the fight made on the utilities bill by down-state interests it was amended so as to apply in the "home rule" section to Chicago alone and would require signatures of 25 per cent of the voters before being submitted to a referendum. This was said to be fatal to the measure. The Senators also voted to eliminate the section which would prevent the new commission from abrogating rate contracts between companies and municipalities.

Another bill filed late in the session would permit the consolidation of elevated and surface lines. Another would allow the proposed "transportation district" an indeterminate franchise for operation of utilities. Both these measures are said to be necessary to make Mayor Thompson's scheme a success.

Two Years of Bickering Ended

Wages Cut, Fares Reduced and One-Man Cars Sanctioned at Davenport—Future Prospects Bright

With one-man cars operating in Davenport, Iowa, fares reduced, and separate wage and working agreements signed with trainmen of Iowa and Illinois, the Tri-City Railway's two years of disputing with trainmen and City Councils has come to an end. Politics, class hatred and ignorance all acted as a deterrent to the utilities there in their attempt to obtain a reasonable rate for their services.

UNDER the agreement signed by the men a wage scale of 50 cents an hour for one-man car operators and 55 cents for trainmen on two-man cars goes into effect. The previous scale was 70 cents an hour on two-man cars, and prior to June 1 there were no one-man cars in operation. The company also refused the international trainmen's union recognition, but recognized the Davenport and Rock Island-Moline locals. Agreements were signed on June 13.

A court order authorizing the operation of one-man cars in Davenport was granted in the District Court by Judge A. J. House on May 19. The railway applied for a temporary injunction a few days before, showing in statements that it was impossible to make a reasonable return on the stock of the corporation with two-man operation. It was also shown that the average return for a four-year period had been only 2 per cent.

Meanwhile the men prepared to strike on the expiration of the wage scale on June 1. B. J. Denman, president of the Tri-City Railway, had announced some months before that the wage scale would be cut from 70 cents to 40 cents an hour on that date. A strike order was issued by the locals for June 1, but withheld when negotiations were taken up with the understanding that the men should work for 40 cents an hour, but that the wage finally agreed upon should be retroactive from June 1.

For a while the company refused steadfastly to recognize the union either

as an international or local. A definite date for a strike was fixed, but this was set aside at the request of Harry M. Schriver, Mayor of Rock Island. He called the traction officials and union representatives together and proposed that Frank T. Hulswit, president of the United Light & Railways Company, Grand Rapids, Mich., of which the Tri-City Railway & Light Company is a subsidiary, should be called to the Tri-Cities.

Mr. Hulswit, then in New York, found that it would be impossible to reach Davenport before the date set by the union for a strike, so he instructed President Denman to proceed with negotiations. Meanwhile Vice-President R. Schaddelee of the United Light & Railways hurried to Davenport.

In two meetings which lasted many hours the traction troubles of two years were ironed out. The scale suggested by Rock Island's Mayor was adopted, the local unions recognized, and a working agreement satisfactory to both the company and the men arrived at.

In Davenport the 9-cent fare, with three for a quarter, was reduced to an 8-cent straight rate through the approval of the use of one-man cars and it is possible that a reduction from 9 cents to 8 would follow the granting of similar privileges to the company in Rock Island and Moline. Bridge line cars which cross the government bridge from Rock Island to Davenport are continuing with two-man operation.

Because of a Socialist administration in Davenport, which made a sport of

baiting the utilities, the railway was forced into the courts to obtain one-man service for that city. Several times attempts to come to an agreement with the City Council were halted at the last moment.

Hoping to "get something on" the railway and light corporation the city ordered a public audit of the company books. The accounts were promptly thrown open by the company to the auditors, who reported to the Council after several months of research. The figures completely backed up the claims of the company that it was virtually bankrupt.

In open Council meeting Henry Vollmer, ex-congressman and special counsel for the city, told the Socialist members that the companies were bankrupt and must be granted one-man service and a higher gas rate. City Attorney U. A. Schreechfield, Socialist, reiterated this statement and it seemed as though an agreement was about to be reached.

Despite this interpretation of the audit and appraisal, the Council refused to meet the company half way. A proposal for the adoption of one-man service and a reduction of fares was spurned. Unable to obtain redress from the city, the railway then took its case to the courts.

Brooklyn Wages to Be Reduced

A reduction in the wages of the employees of the Brooklyn (N. Y.) Rapid Transit Company to take effect on Aug. 6 has been determined upon by Lindley M. Garrison, receiver of the company. Mr. Garrison has sent letters to the various committees representing the employees whose wages were increased last August, asking them to get together and take up the matter and agree, if possible, on the amount of the reduction.

The receiver has sent the following letter to William S. Menden, general manager for the company:

You will recall that in my notice to employees dated July 16, 1920, I made the most recent increase in rates of pay, practical upon an annual basis. This became effective on Aug. 6, 1920. That increase, added to previous increases, amounted to 35 per cent above the rates in effect on Aug. 1, 1919.

Owing to conditions, which need not be recited, it is obvious that we can no longer continue at the present high scale. I have abstained, in view of the circumstances, from making any reductions until the lapse of a year from the time of the last increase. That year will be up on Aug. 6, 1921. The time has now come when this matter must be taken up, and I wish that you would in due course confer with the various representative bodies in order that a proper basis may be arranged for the wage scale after Aug. 6, 1921.

The so-called "representation plan" in Brooklyn was formulated by Judge Julius M. Mayer of the United States District Court in co-operation with Mr. Garrison. In November of last year the first elections were held and men who had been with the company for sixty days were allowed to vote. But it was specified that they take an oath that were not members of the Amalgamated.

The present rate of pay for motor-men and conductors on the surface lines

is 57, 59, 62 and 67 cents. On the elevated lines the conductors are receiving 59, 60 and 62 cents while the guards are receiving 53, 54 and 57.

Readjustment of wages has also been suggested by the officers to the men of the Interborough and the New York Railways.

Railway Man Killed in Accident—Others Injured

Spencer Vandenberg, manager of the Louisville Safety Council, died on June 14 at Norton Infirmary, Louisville, Ky., from injuries suffered Saturday when the automobile in which he was returning from a round-table barbecue ran into a tree. By the irony of fate Mr. Vandenberg was killed in an accident of the kind he was trying to educate the public to avoid.

Mr. Vandenberg was on the way home in the car of George Dehler, who asked several friends to ride with him. Mr. Vandenberg, Neil W. Funk, Frank E. Belleville, general auditor of the Louisville Railway, and John Carroll were also in the car when it ran into a tree at a sharp turn in the road near St. Matthews. Mr. Vandenberg was thrown against the tree. He suffered four broken ribs, a fractured left hip, injuries to the right leg, and cuts and bruises. It is believed that a broken rib punctured the lung and brought on pneumonia which terminated fatally.

Mr. Vandenberg went to Louisville in January from Schenectady to become manager of the Safety Council, engaged in the work of teaching the public to avoid accidents. His home was in Eastover. Mr. Vandenberg was formerly with the Schenectady Railway.

Mr. Funk is expected to recover. He is superintendent of the claim division of the Louisville Railway. He had expected to go on the C. E. R. A. boat trip. Among his injuries is a fractured hip.

Programs of Meetings

Final Arrangements for C. E. R. A. Summer Meeting

The program for the summer meeting of the Central Electric Railway Association, which will be held on board the S.S. *South American*, has been announced by Sam W. Greenland, chairman of the program committee. The summer cruise of the association will begin at Chicago, where the boat will leave from the Municipal Pier on Sunday morning, June 26, at 8:30 a.m. central standard time, or 9:30 Chicago time. It will leave Toledo Tuesday morning, June 28, at 11 o'clock central standard time or 12 o'clock eastern standard time, from the Toledo Railway & Light Company dock, which is adjacent to the White Star Line docks. The time of leaving Toledo was set back one hour by the committee on arrangements in order to permit various members to leave their homes Tuesday morning and arrive in Toledo in time

to catch the boat. The details of the program follow:

Sunday, June 26, 11 a.m.

Song Service.
Address, by H. C. DeCamp.

Wednesday, June 29, 9 a.m.

Meeting of the Executive Committee.
"Automatic Substations," by C. A. Butcher, Westinghouse Electric & Manufacturing Company.

Discussion by Lawrence D. Bale, engineer of substations, the Cleveland Railway; Charles H. Jones, Chicago, North Shore & Milwaukee Railroad.

Thursday, June 30, 3 p.m.

"Merchandising Transportation," led off by the report of the committee on education and training of employees, by James P. Barnes, chairman, president Louisville Railway.

Discussion by Harry L. Brown, Western Editor *ELECTRIC RAILWAY JOURNAL*, Chicago; Bert Weedon, general freight and passenger agent, Interstate Public Service Company, Indianapolis; George H. Kelsay, superintendent of power and shops, Cleveland, Southwestern & Columbus Railway, Elyria, Ohio; W. S. Rodger, general traffic manager, Detroit United Railway; E. B. Gunn, master mechanic, Western Ohio Railway, Wapakoneta, Ohio.

SPECIAL CARS TO BE RUN

The proposal to run a special car from Indianapolis to Chicago on Saturday, June 25 is being considered.

Those arriving in Chicago on Saturday night may go direct to the boat and secure their staterooms and breakfast Sunday morning on the boat for \$2.50. The boat will be at the pier after 6 p.m., Saturday.

For those who desire to make only the trip from Toledo to Chicago, a special car has been arranged, leaving Indianapolis on Monday, June 27, at 7:00 a.m., Peru, Ind., at 9:30 a.m., and arriving at Fort Wayne, Ind., at 11:10 a.m. A thirty-minute stop here will be made for lunch and the car will leave Fort Wayne at 11:40, Lima, Ohio, at 1:40 p.m., Findlay, Ohio, at 2:50 p.m., and arrive at Toledo at 5:05 p.m., central standard time in each case.

On the return trip a special car will be run from St. Joseph, Mich., to Indianapolis, leaving St. Joseph July 12.

Those planning to attend this meeting and cruise, are urged to send in their reservations to John Benham, 15 South Throop Street, Chicago, at once, in order that their names may appear in the printed souvenir distributed on the boat.

Railroad Mechanical Section Postpones Meeting

The annual meeting of the American Railway Association, mechanical division, which was to have taken place at the Drake Hotel, Chicago, on June 15 and 16, has been postponed to June 29 and 30, 1921. The meeting place has also been changed from the Drake Hotel to the Blackstone. The official circular of June 10 announcing the postponement says:

Owing to present unusual conditions and inability of members to attend the meeting of the mechanical division, American Railway Association, called to be held in this city (Chicago), Wednesday and Thursday, June 15 and 16, 1921, the meeting has been postponed to Wednesday and Thursday, June 29 and 30, 1921.

The sessions will be held at the Blackstone Hotel, Chicago, instead of the Drake Hotel as originally planned. It is suggested that members arrange for their hotel reservations without delay.

Financial and Corporate

Preferred Stock Offering to Be Continued

In the belief that it will be of advantage both to itself and to the communities served to have as many local stockholders as possible, the Monongahela Power & Railway, Fairmont, W. Va., will continue to offer its preferred stock even after the recent \$2,000,000 offering of preferred stock has been taken. This offering was referred to in the ELECTRIC RAILWAY JOURNAL, issue of May 28.

A new department known as the "Investment Department" has been created to handle the sale of stock, bonds and other forms of securities offered. E. B. Smith is the manager of this department. He has eight salesmen in his organization at present. In addition to these regular salesmen, Mr. Smith is organizing the company's employees and has selected about fifty as an additional employees organization. Arrangements have been made with the banks in the territory served by the company whereby they will also assist in selling the stock. Thus the organization worked out for the handling of the stock includes eight regularly employed salesmen, about fifty employees and the banks, fifty-four in number.

Besides the offering being made direct to patrons through salesmen, advertising is being carried in ten newspapers, where every family is urged to become a "profit-sharing partner." In order to educate the public regarding the character of the company, extent of its property, kind of services rendered and its relation to the growth of the communities served by it descriptive matter and circulars have been

mailed to patrons and customers and display cards announcing the sale have been posted in the company's ticket offices and waiting rooms. In connection with this offering the company has issued an interesting illustrated booklet,




Announcing

AN OPPORTUNITY

**To Become a Profit-Sharing Partner
In a Successful Enterprise**

Now is Your Opportunity to Invest
Assured Safety **Quarterly Dividends**

DON'T COMPARE THIS STEADY INVESTMENT WITH SPECULATIVE
investing in real estate, stocks, bonds, etc. It is a safe and profitable
investment in a growing industry.

DON'T BE MISLED BY THE CLAIMS OF SMALL MONTHLY PAYMENTS
Made on Annuity, Pension and Other Similar Investments

INQUIRY COUPON

Monongahela Power & Railway Co.
Watson Building, Fairmont, West Virginia
Telephone No. 1000
"ASK YOUR BANKER"
"Every Family a Shareholder"

TYPICAL NEWSPAPER ADVERTISEMENT

containing a map of the company's electric railway properties, proposed lines, power stations, gas lines, coal mines, etc.

Although the outcome of this offering cannot at this time be clearly indicated, the sales made to date have been much in excess of expectations and indicate the success of the offering.

Toledo \$260,672 Behind

Cumulative Deficit Increased by \$56,371 in May—Prospects Greatly Improved

The increasing economy of operation of the Toledo railway lines, under Commissioner Wilfred E. Cann, is shown in the report for May, when the smallest monthly deficit yet sustained was reported. The net loss in operation for the month was \$56,371. The total deficit accrued in four months is \$260,672.

Chairman Henry Truesdall of the board predicted a fare increase to 7 cents in August. The service-at-cost ordinance provides for no fare change in the first six months of operation. Commissioner Cann believes, however, that fares will be back to 5 cents within a year.

During the month of June further anticipated savings should amount to \$25,000, due to decrease in wages of carmen. The men last week ratified the agreement by which their scales were set at 45, 47 and 50 cents an hour. This is a cut of 10 cents an hour from the last year scale. This new scale was incorrectly reported in the ELECTRIC RAILWAY JOURNAL for June 11 to be 45, 57 and 60 cents.

The power rate has not yet been adjusted. Some believe it can be reduced nearly 50 per cent. Even a 10 per cent reduction would mean a saving of \$24,000 on four months' operation.

Further rerouting plans have been approved. Service will be cut off the Maumee Avenue end of the Starr-Maumee line. Cherry cars will not run from the Union Station loop. A saving of more than \$4,000 a month with little change in service will thus be gained.

No decision has as yet been made by the Common Pleas Court on the bus regulatory measure. The case is held up by a temporary injunction which bus owners secured.

In May, although railway passenger receipts fell off \$2,631 as compared with the previous month, due to increased interurban rentals and car rentals, the net income increased \$8,677. Operating expenses were cut \$15,286 as compared with April. The monthly operating ratio also decreased from 90.60 to 83.46.

Commissioner Cann said the loss of 1.0544 cents per passenger during May should call for a further reduction in service but that the present schedules would be maintained. Average daily passenger receipts for the last four months are as follows: February, \$9,500; March, \$9,186; April, \$8,988; May, \$8,613. June shows a further decline over May figures of \$325 a day.

Construction Company Denied Payment.—The application of the Interborough Subway Construction Company, an Interborough subsidiary, for a writ of mandamus directing Controller Craig to pay the company \$1,750,000 as part of the cost of installing the multiple car door device, was denied recently by Justice Gavegan of the Supreme Court.

MONONGAHELA POWER AND RAILWAY COMPANY

POWER GAS RAILWAYS COAL

FAIRMONT, W. VA.

Dear Sir:

Arrangements have been made whereby we are enabled to offer our patrons the opportunity of owning an interest in this Company through the purchase of its Preferred Stock.

This opportunity to purchase stock is given because:

1. We want your good-will and co-operation.
2. Our own home people are entitled to the opportunity to invest in a home industry, to the support of which they all contribute and upon which the development of the community so largely depends; and especially since it affords an investment that offers a substantial return with a maximum security.

This stock may be purchased at a price showing a return of approximately eight (8) per cent.

Your name and address on the attached postal card will bring you full information on this proposition.

Very truly yours,

MONONGAHELA POWER AND RAILWAY COMPANY
George H. Alexander, President

INFORMATION SHEET

MONONGAHELA POWER AND RAILWAY COMPANY

CUMULATIVE PREFERRED STOCK

Price: \$19.00 per share of \$25.00 par value. This price subject to change and confirmation from this office.

Dividends: Payable January, April, July and October to shareholders of record the last day of previous month: 10% is paid on such of the above date or at the rate of 6% per annum on the par value of the stock. The company has paid dividends on its preferred stock continuously since organization.

Yield: Preferred Stock purchased at the above price will yield a yearly return of nearly 8% on the investment.

Market: In the event you should find it necessary to dispose of your stock the company will handle the resale of it at the prevailing market price less a reasonable charge for handling.

Taxes: Tax Preferred Stock is exempt from personal property taxes. Dividends are free from normal Federal Income Tax.

Voting Rights: Preferred Stock carries full voting rights.

Properties Back of the Investment: Properties are described in detail in booklet, "Some of Our Properties" enclosed herewith.

Safety of the Investment: The company supplies necessary services to the Public, Industry and Commerce. This service consists of Power, Interurban and City Railways, Electric Lighting and Gas. The Company also operates Coal Mines and a Gasoline Plant. The demand for this service is constantly growing.

Maintenance: All properties are maintained at a high degree of efficiency, as may be ascertained by personal inspection upon application to the Company.

PARTIAL PAYMENT PLAN

Price: Same as cash price, payable \$2 share at time of purchase and \$2 per month thereafter, with privilege of full payment at any time.

Interest: 6% per annum is allowed on all payments if payment in full is made. 3% interest is allowed in case of withdrawal of funds and upon surrender of temporary stock certificate and receipt for payments.

Receipts for Payment: Temporary certificate is issued to purchaser when first payment is made, and further payments are endorsed thereon as made. Permanent registered stock certificate is issued upon completion of payments. Interest on payments is also computed at the same time.

Further information will be gladly furnished by mail or by a representative of the Company.

APPEAL MADE DIRECT TO PROSPECTIVE PURCHASER

Answers to Accounting Questions

Another Series of Questions and Tentative Answers Under the Uniform System of Accounts for Electric Railways

Another series of tentative answers to questions raised in connection with the uniform system of accounts, prescribed by the Interstate Commerce Commission, has just been issued. As these answers have not received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be required proper before final promulgation in the accounting bulletins of the commission.

THE case numbers covered below are from A-589 to A-602, with certain omissions. Other installments will follow. The omitted numbers represent cases which either are not of sufficient importance to justify publication or involve questions upon which a definite conclusion has not been reached.

Q. (A-589). To what account should be charged:

(a) Taxes payable on monies and other items the income from which is includible in account 208, "Income from unfunded securities and accounts?"

(b) Federal income and excess profits taxes?

(c) Internal revenue stamps for use generally in railway operations?

(d) A carrier's investment in war savings stamps and war thrift stamps?

(e) War taxes paid on telephone and telegraph messages?

A. (a) To account 215, "Taxes assignable to railway operations," or to account 218, "Miscellaneous taxes," in accordance with the texts of those accounts.

(b) To account 215, "Taxes assignable to railway operations," unless directly assessed on income from miscellaneous physical property, in which case account 205, "Net income from miscellaneous physical property," shall be charged or unless they are assessed on income from securities owned and are therefore chargeable to account 218, "Miscellaneous taxes."

(c) To account 215, "Taxes assignable to railway operations."

(d) To account 409, "Loans and notes receivable."

(e) To account 215, "Taxes assignable to railway operations," or to road and equipment account 549, "Taxes," as may be appropriate.

(See Cases 584 and 598 (a).)

Q. (A-590). An industry furnishes cars for movement of its employees from city points to its suburban plant. The carrier furnishes locomotive, crew and electricity, and hauls the cars over its own rails to the industrial plant, for which it is paid on the basis of locomotive trips. How should the revenue be credited?

A. To account 109, "Miscellaneous transportation revenue."

Q. (A-591). A carrier under contract to transport mail, during a temporary stoppage of its own transportation facilities, hires an automobile and driver to perform that service. To what account should the expense be charged?

A. To account 78, "Other transportation expenses."

Q. (A-592). What is the proper accounting for investment in and maintenance of turntables located at the entrances of shops?

A. The investment is chargeable to account 523, "Shops and carhouses," and the maintenance to account 24, "Buildings, fixtures, and grounds."

Q. (A-593). To what account should be charged:

(a) The cost of special work or curves made in the carrier's own shops?

(b) The cost of cut rails issued from stock to connect such items as switch mates, switches, frogs, etc., in the lead of a special work layout?

A. (a) To account 508, "Special work." Plain curves shall be treated as rails.

(b) If the cut rails are only sections of rail which are necessary to connect up the switch mates, switches, frogs, etc., with the last regular rail laid in the track their cost shall be charged to account 507, "Rails, rail fastenings and joints," but if they are of special character, not simply a section of ordinary rail, they shall be included in account 508, "Special work."

Q. (A-595, a). When electric light sockets and switches are installed as permanent parts of buildings, cars or conduits, should renewals be considered supplies as indicated in Case 216 in Accounting Bulletin 14?

A. In such cases they shall be charged for appropriate repair accounts.

(See Case 69, Accounting Bulletin 14.)

Q. (A-595, b). To what account should be charged the pay of employees under the supervision of the general treasurer who are stationed at car barns to receive conductors' collections?

A. To account 63, "Superintendence of transportation."

Q. (A-596, a). To what account should be charged repairs of oil pumps, oil tanks and permanent tank piping installed in an oil house at shops?

A. If this apparatus is for distributing oil for shop use, the repair expense for the tank and piping shall be charged to account 24, "Buildings, fixtures, and grounds," and that for the pump, if not a part of the tank, to account 36, "Shop equipment." If the apparatus is for oil used in connection with conducting transportation, all repairs shall be charged to account 24.

Q. (A-596, b). To what account should be charged repairs to a sand hopper and to the piping connecting the sand drier with the hopper?

A. To account 24, "Buildings, fixtures, and grounds."

Q. (A-597). To assist in retaining its employees a carrier built and operates a temporary rooming building. How should the revenue and expenses of this project be distributed?

A. Rents received from employees shall be credited to account 117, "Rent of buildings and other property." Building repairs shall be charged to account 24, "Buildings, fixtures, and grounds," and expenses of operating for employees' use to account 78, "Other transportation expenses."

Q. (A-598, a). To what account should be charged:

(a) The cost of revenue stamps affixed to proxies sent in by stockholders for use at the annual meeting? (b) The cost of stamps affixed to notes classified as unfunded debt?

A. (a) To account 225, "Miscellaneous debits," (b) To account 221, "Interest on unfunded debt."

(See Cases 584 and 589.)

Q. (A-598, b). A carrier assumes the rent for an encampment site in order to induce school cadets to hold an encampment on its line. To what account should the rent be charged?

A. To account 81, "Parks, resorts and attractions."

Q. (A-599, a). At the direction of the court, pending a decision as to the legality of a fare increase, a carrier deposits daily with a trust company amounts equivalent to the difference between revenue based upon the former fare and the total of fares collected. What is the proper accounting?

A. The deposits with the trust company shall be debited to account 408, "Special deposits," and concurrently credited to account 446, "Other unadjusted credits." If final decision favors the carrier the amount shall be transferred from account 446, to account 101, "Passenger revenue," unless the decision is delayed beyond the current year and the amount is relatively large, in which event the carrier may apply for permission to use account 304, "Delayed income credits." If the increased fare is decided to be illegal accounts 408 and 446 shall be cleared as the refunds are made.

Q. (A-599, b). What is the proper accounting for equipment permanently retired from service but held for disposition?

A. It shall be written out of the property account and carried in a suspense account at an equitable valuation.

Q. (A-601). To what account should be charged the cost of metal fare tokens sold to patrons for use in lieu of tickets and coins?

A. To account 67, "Miscellaneous car service expenses." Tokens held in stores shall be carried in account 411, "Material and supplies," until issued for use.

Q. (A-602, a). To what account shall be charged the cost and maintenance of a pier to be used exclusively for handling powerhouse fuel?

A. The investment cost shall be charged to account 539, "Power plant buildings," and the maintenance cost to the appropriate primary accounts under general account III, "Power."

Cash-Fund Ordinance Pending

In consideration of the June appropriation ordinance for the Seattle (Wash.) Municipal Railway it was decided at a recent meeting of the utilities committee of the Council to set aside each month out of the earnings one-twelfth of the yearly charges for bond interest and redemption. The department's auditor suggested waiting until the interest and redemption dates before setting aside the cash needed to save going on a warrant basis earlier.

Superintendent D. W. Henderson, however, said the fund had \$132,574 in cash on hand in the city treasury after allowance for outstanding warrants, and recommended setting aside the interest and redemption cash since there was a surplus on hand. The first item considered was setting aside interest and redemption on an issue of \$775,000 general bonds, maturing from 1933 to 1938. As the state law does not require setting aside money for redemption of general bonds until seven years before maturity, it was voted not to set aside money for this purpose now. It was decided to set aside funds for interest on the general bonds, also for interest and redemption on the utility bonds.

As the matter stands at present, the railway did not set aside in March, April or May the \$70,250 chargeable monthly for the redemption of the \$833,000 issue of the \$15,000,000 Stone & Webster bonds due next March 1, and on another small issue, and so owes that fund \$210,750. The \$70,250 for June for this purpose will be set aside. No money has been set aside for depreciation, the money being used to retire outstanding warrants.

Coal, Material and Labor Costs Decrease Earnings

According to the annual report of the Terre Haute, Indianapolis & Eastern Traction Company for the year ended Dec. 31, 1920, the company had, after paying operating expenses, taxes and fixed charges, \$725,000 to meet dividend requirements, interest on notes, car trust equipment notes, sinking funds, etc. Gross earnings amounted to \$5,316,288, an increase of 18.64 per cent over the previous year, while operating expenses, which were \$3,805,565, were 23.38 per cent more than in 1919. This increase absorbed practically all of the gain in earnings due to advances in the price of coal, material and labor.

The tax rates were raised in 1920, so that the average rate on the entire system was \$1.85 as compared with \$1.26 in 1919. The result of this was that the amount paid out in taxes for the year increased 18.96 per cent.

The total amount spent for maintenance was \$1,314,192, compared with \$1,059,898 in 1919. The greater proportion was for maintenance of way and structures, which amounted to \$694,274, an increase of \$210,920 over the previous year. The total railway

maintenance was \$1,135,761 as against \$946,122 in 1919.

Some idea of the amount of traffic handled can be had from the following statistics: During the year 9,719,308 passengers were carried on the interurban lines and 19,671,918 on the city lines, making a total of 29,391,226 passengers of all kinds. The freight tonnage handled was 134,342 in addition to 116,292 tons of express matter. The car-miles operated on the interurban lines amounted to 5,837,378 and on the city lines 3,424,961. The coal consumed at the power station was 261,239 tons, while the kilowatt-hours generated at the main power station were 118,527,211. The company operates 435.64 miles of main line, of which 33.21 miles are so-called city lines.

\$19,628 Earned on \$3,576,740 Investment

The annual report of the Bamberger Electric Railroad recently filed with the Public Utilities Commission of Utah shows a net profit of \$19,628 from operation on an investment of \$3,576,740 in its 35.94 miles of road, running between Salt Lake City and Ogden, Utah.

The report shows that the company had on hand at the beginning of the year accredited to profit and loss the sum of \$602,327, and at the end of 1920 the sum of \$621,955. The increase in the grand total of its assets over the year 1919 amounted to \$261,416, or from \$3,858,314 at the close of 1919 to \$4,119,729 at the close of 1920. Of this latter figure the company claims to have assets of \$3,576,740 in road and equipment, an increase of \$182,255 over the preceding year and \$46,802 in miscellaneous property, or an increase of \$17,500 over 1919.

The investments in affiliated companies shows neither increase nor decrease. This amounts to \$147,652. In bonds investment the increase amounts to \$600, bringing the total investment in bonds to \$36,800. The total investment exceeded the 1919 figure by \$200,355.

Current assets shows an increase of \$61,685 in spite of several large decreases in certain lines, such as a \$40,000 decrease in special deposits. Miscellaneous accounts receivable show an increase of \$55,068, and the materials and supplies purchased during 1919 add considerable to this figure in compiling the current assets figure.

The sum of \$52,083 was invested in road equipment during the year. In addition \$1,766 was expended in substation equipment and \$2,874 in miscellaneous expenditures, bringing the total expenditures for betterment up to \$182,255.

The company has 73.21 miles of tracks at an average investment of \$48,856 per mile.

The company holds \$75,000 in first mortgage bonds of the Salt Lake & Ogden Railway drawing interest at 5 per cent, which is the only money or security in the sinking fund.

Financial News Notes

Portland Dividend Declared.—The Portland Railway, Light & Power Company, Portland, Ore., recently declared an initial dividend on the Series "A" first preferred $7\frac{1}{2}$ per cent stock. This payment covers dividends for the period of Jan. 1, 1916, to April 1, 1917.

\$3,000,000 Offered in Bonds.—Whitaker & Company, St. Louis, Mo., are offering three-year 8 per cent sinking fund mortgage bonds of the Columbus Railway, Power & Light, Columbus, Ohio. The bonds are dated June 1, 1921, and are due June 1, 1924. The price is 98 and interest to net $8\frac{1}{2}$ per cent.

Operation of Line Expected.—At a recent conference between Receiver Whysall, his attorney, and W. P. Sturtevant, New York, representative of the bondholders, it was brought out that service may be resumed by the Springfield Terminal Railway & Power Company, Springfield, Ohio. Receiver Whysall, who will plan the reorganization, has given out no statement on this project. The property was sold under foreclosure in June, 1920, for \$300,000.

Raleigh Property for Sale.—James H. Pou, Raleigh, and N. A. Sinclair, Fayetteville, N. C., have been appointed commissioners to sell the property of the Cumberland Railway & Power Company, Raleigh, N. C., at receiver's sale on July 2. The company was organized in 1919 and acquired the street railway property in Fayetteville which had long been in disuse. Some months ago a receiver was appointed for the property on the petition of a Lillington bank when interest was defaulted.

Railway Offered to People.—At a recent meeting of the Valdosta (Ga.) Chamber of Commerce the possibility of dismantling the Valdosta Street Railway was discussed. The property just about pays expenses and it was stated that unless the people took over the railway it probably would be junked. Judge Crawford stated that if 100 or more people would take over the railway and work in its interest operating expenses and a small dividend could be paid. The offering price is \$15,500.

Eureka Property for \$75,000.—The people of Eureka, Cal., will be offered the property of the Humboldt Transit for \$75,000, and provision will be made for an additional \$30,000 as working capital for the operation of the lines by the city. This proposition will be voted on June 20. The State Railroad Commission recently valued the property at \$100,000 but the attorney for the Humboldt National Bank, which represents the bondholders of the railway, announced that the bank had been authorized to submit \$75,000 as the valuation of the lines.

Traffic and Transportation

Autos Under Commission

California Railroad Commission Announces Establishment of Automobile Department

So rapid has been the growth of the automobile transportation industry that the Railroad Commission of California has announced the establishment of an automobile department under the supervision of Charles A. Beck. This department will be responsible for all detail work connected with the automobile stage and truck matters, will care for all informal complaints and correspondence, keep time-table and schedule filings, handle applications which can be disposed of by ex parte orders, handle and assign applications requiring public hearing, answer all verbal inquiries, and in general be responsible to the commission for all work in connection with the operation of stages and trucks under its jurisdiction.

Rates, fares and regulations will be handled by the rate department. Issuance of stock, bonds, notes or other securities and the filing of annual or other financial statements will be handled by the department of finance and accounts. The service department as heretofore will look after safety of operation, equipment of cars and the like.

The commission announces that Mr. Handford will be responsible for the formulation of definite lines of policy affecting auto, stage and truck transportation so as to promote uniformity of decisions. Opinions and orders, excepting the minor ex parte orders, will be reviewed and concurred in by Mr. Handford before presentation to the commission for its consideration.

In all matters of accident, investigation and other questions incidental to transportation from the service standpoint, the service department will continue to function through Mr. Handford reporting to the commission as heretofore.

The numerous complaints that come up from competing auto stage lines in regard to irregular operations of some of the auto bus lines have been noticeable at various hearings before the commission during the past year. Recently the Pasadena-Pomona auto stage line filed a complaint with the commission citing the fact that the Motor Transit Company, the largest auto stage operating lines out of Los Angeles, in operating its auto stages between Los Angeles and San Bernardino was violating the terms of its operating franchise rights granted by the Railroad Commission by doing local business on its through schedule. This class of complaint with auto stage lines is frequent with the commission, as many

of the stage lines were losing money during the year 1920 and found it difficult to strictly abide by its franchise.

Recently the Burbank Stage Line in applying for an increase in rates informed the commission its losses for the year were \$20,000. The Motor Transit Company claimed a loss of \$120,000. At a recent hearing of a freight auto transportation line running out of San Diego, where an application had been made to the commission to increase its rates 25 per cent, the commission denied the increase as the manager of the auto freight carrying line could not produce any figures as to his losses, stating that he did not keep any books.

City of Toronto Plans Important Rehabilitation

The Board of Control, Toronto, Ont., has recommended that the City Council pass a by-law providing \$7,000,000 for the use of the Toronto Railway Commission in connection with the purchase of the new cars and other equipment by the commission for use next fall when the city takes over the Toronto Railway. H. H. Couzens, Toronto, is general manager of the Toronto Transportation Commission, Ryrie Building, Toronto.

The commission is also planning to construct a new railway through Rosedale and the north limits of the city passing east of Mount Pleasant Cemetery. This line will be constructed if the city opens up certain streets requested by the commission.

The arbitration board has been finally completed which will determine the price to be paid and other details in connection with the acquisition by the city of Toronto (Canada) of the Toronto Railway system upon the expiration of the railway franchise, which takes place next September.

The railway chose Sir Thomas White, former Minister of Finance in the Dominion Government, while the municipality appointed Sir Adam Beck, chairman of the Hydro-Electric Power Commission. These two arbitrators have now agreed upon Hume Cronyn, M. P., as the third member and chairman of the board. Mr. Cronyn is a native of London, Ont. He is prominently identified with a number of financial institutions in his home town.

Transfers Reduced in Size.—The Milwaukee Electric Railway & Light Company placed in use on June 1 on its Milwaukee city lines a reduced-size transfer. The new transfer is 2 in. x 4 in., or 1½ in. shorter than the transfer previously used. The change in size of the transfer was made for the purpose of conserving paper stock.

New Board Attacked

Counsel for Public Service Railway Contends Before Court Evidence Proved Ten-Cent Fare Need

Argument was heard in Part II of the Supreme Court at Trenton, N. J., on June 10 upon the appeal of the Public Service Railway from the decision of the Board of Public Utility Commissioners refusing to grant the corporation permission to charge a 10-cent fare. Frank Bergen and Robert H. McCarter, former attorney-general of the state, appeared for the company. The commission was represented by L. Edward Herrmann, its counsel. The cities, which are opposing the increase, were represented by George L. Record. The court reserved decision.

Mr. Bergen said that the proceedings of the board in recent years had taken a direction and reached a point which not only threatened but seriously affected the fundamental rights of parties interested in utility corporations. He said further that whether or not an existing rate was reasonable was a judicial question. At one phase of the proceedings Justice Trenchard interrupted Mr. Bergen to inquire: "This is really an attack on the utility act by you, isn't it, not on the order of the board in question?"

Mr. Bergen answered that it was an attack on the method employed by the board in the face of overwhelming testimony.

TEN-CENT FARE ESSENTIAL

Mr. Bergen said further that under the present 7-cent fare the company will lose more than \$2,000,000 during the calendar year. The commission had failed for several years past, he said, to provide a fare sufficient to meet operating expenses, fixed charges, taxes and depreciation, let alone a return on the company's capital stock of \$48,731,600. It was Mr. Bergen's contention that the 10-cent fare would enable the company to pay its taxes, operating expenses and fixed charges, set aside \$1,850,000 for depreciation and earn a net income of \$1,266,000, or 2½ per cent on its capital stock, provided the rate were granted for a full year.

Mr. Bergen said:

Disaster to the company is inevitable unless it is afforded the instant relief to which the Court of Errors and Appeals has held it is entitled. It is intolerable that a plain remedy should be withheld by the board for reasons unsupported by either facts or law. The utility act expressly provides for the fixing of a reasonable rate under the conditions that here exist, and the Court of Errors has clearly defined what elements are to be considered. At the hearings the board solemnly declared its purpose to obey the law as laid down by the court (Case, page 364), but when the time for action arrived it reversed its intention. It is indeed fortunate that we have this court of law to which we may confidently appeal.

In opening his case for the municipalities Mr. Record declared that the commission could have withheld its decision until after July 15, when it was bound by law to announce what it considers a just and reasonable fare. By rendering its decision it gave the company opportunity to appeal in this case, thereby delaying valuation proceedings.

Birmingham Situation Critical

Several Months of Operation Prove Seven-Cent Fare Inadequate—Jitneys a Menace

Hearing of an application of Lee C. Bradley, receiver for the Birmingham Railway, Light & Power Company, Birmingham, Ala., for authority to raise fares in Birmingham has been set for June 28 before the Alabama Public Service Commission at Montgomery. Right to increase fares from 7 to 8 cents in Birmingham and its suburbs and to levy a charge of 2 cents for transfers is asked in the petition, which was filed by Mr. Bradley on June 8 before the Public Service Commission. Judge William I. Grubb, of the United States District Court, issued a formal order on June 4 authorizing the receiver to apply for the increased fare.

VIGOROUS opposition to any increase in the present 7-cent fare has been voiced by members of the City Commission of Birmingham, who state that the city will fight the proposed advance to the bitter end. It has been indicated by city officials that the public utilities act, under which the Alabama Public Service Commission is granted the exclusive right to regulate rates to be charged by public utility companies operating in the state, may be attacked in the efforts to defeat an increase in fares.

Heavy decreases in the earnings from the operation of the railway are set up by the receiver as the grounds upon which the increase is asked. In his application he shows that receipts have decreased in spite of the recent raise in rates from 6 to 7 cents.

Operation of jitneys in competition with the railway is given by the receiver as one of the contributing causes for the decrease in revenue from the railway department. However, the general business depression and the unemployment situation are cited as the principal cause for the decrease in earnings.

A jitney regulation ordinance was recently adopted by the City Commission, but has not yet been put into effect. Under the terms of this the receiver maintains that the jitneys are recognized by the city as a competing service. The ordinance as originally drafted provided that all jitneys must furnish an adequate indemnity bond or must carry an adequate amount of liability insurance, but these provisions were killed by the majority of the commission before the final adoption of the ordinance. As adopted it provides certain police and traffic regulations and routes for the jitneys. In some instances they are removed from the railway lines, but in several others the jitney routings are allowed to follow the car lines.

In his application to Judge Grubb for authority to apply for the increases Receiver Bradley reviews at length the financial situation of the Birmingham Railway, Light & Power Company and of the causes which make the increased fare necessary. It is shown that when the application for a 7-cent fare was made the cash condition of the estate as of Nov. 1, 1920, showed a deficit of \$1,435,101 with other obligations which increased the total obligations of the receiver to \$1,873,822.

The increase in fare to 7 cents, it was estimated, according to the application, would produce approximately \$25,000 a month in increased net revenue. The petition shows, however, that in January with the 7-cent fare there was an increase of \$32,719 in comparison with January, 1920. In February there was a gain of \$25,009 over the preceding February. March showed a gain of \$15,779 over the same month of 1920. But April showed a loss of \$10,871 in comparison with the preceding April. May showed a loss of \$24,007. Pointing to the steady decrease the receiver says:

Instead of receiving approximately \$25,000 a month in increased revenue, we find that in the month of May we have a decrease of \$24,007, or approximately \$50,000 less than was deemed necessary at the time the 7-cent fare was granted.

This condition, Mr. Bradley states, results from business depression and that all lines are showing decreases in comparison with the figures for last year. Lines upon which jitneys are in operation, he states, are showing very heavy decreases. Owing to the uncertainty of jitney operation the receiver points out that it is difficult to estimate the loss caused but that from checks made they were apparently causing a loss of approximately \$700 a day during the month of May. The loss from the business depression was estimated at \$900 a day for May.

Although operating expenses, it is stated, have been cut from 32.3 cents per car-mile in December, 1920, to 30.5 cents per car-mile in May, 1921, yet the increased revenue from the 7-cent fare has been more than offset by jitney competition and business depression. Other departments are shown to be making a profit or breaking even.

Fare Restraint Suit Brought

A suit to restrain an increase in fare by the Cincinnati (Ohio) Traction Company on July 1 from 8½ cents to 9 cents was filed in the Hamilton County Common Pleas Court by Saul Zielonka, City Solicitor of Cincinnati, during the week ended June 11. Judge Stanley Struble granted a temporary injunction. The suit, similar to a previous one, was made necessary because under the present franchise of the railway, the company contends it must give notice on the fifteenth of the month where deficits have occurred in operation of its lines.

The company and city officials within

the last few days have agreed to changes in the franchise, as a result of which, among other things such injunction suits will be unnecessary in the future. As in the former suits in which an increase in the rate of fares was enjoined by the city, the city solicitor again predicates upon the contention that if proper adjustments are made of credits given to subsidiary companies of the Ohio Traction Company the Cincinnati Traction Company would not have a deficit.

Jitney Regulation in Detroit

A new ordinance has recently been passed in Detroit, Mich., regulating jitneys. The new ruling will compel owners and drivers to furnish surety bonds and to indemnify passengers against loss or injury. Owners must supply a \$1,000 bond and pay a \$3 license fee for every car operated while drivers must put up a \$200 bond. Licenses are revocable at the Mayor's will. The penalty for violation of the ordinance is a \$500 fine or a prison term of 90 days. The rule became effective on June 15 and will result, it is believed, in a substantial reduction of such vehicles operated.

Litigation Dismissed in Cedar Falls

At a special meeting of the City Council of Cedar Falls, Ia., on May 31, called for the purpose of further consideration of the long drawn-out fare controversy, a resolution was adopted accepting the Waterloo, Cedar Falls & Northern Railway's proposition. Accordingly the 8-cent cash fare continues until the latter part of August and the city of Cedar Falls has dismissed the litigation and authorized the trustee to turn the balance of the money back to the railway.

The 10-cent fare was established in Cedar Falls in September, 1920, by injunction proceedings in the District Court of Black Hawk County, Iowa. Under an order of court the company was required to issue receipts to passengers requesting the same, covering the difference between a 5-cent cash fare and the 10-cent fare, the money represented by such receipts issued being deposited in the hands of a trustee, to be held as a fund in court for future order of the court. The 10-cent rate was collected under this plan until March 1, 1921. The latter part of February, at a meeting between Manager Cass and the City Council of Cedar Falls, Mr. Cass agreed for experimental purposes to install a 7-cent cash fare rate for the month of March, if they would turn over to the company the money that was in the hands of the trustee represented by the receipts outstanding, in amount of 3 cents per receipt. Further that if the 7-cent cash fare rate did not produce an average gross revenue equal to the average gross revenue at the 10-cent rate for the preceding five months that they would permit an 8-cent fare to be installed on April 1.

The agreement was made, the money was drawn down by stipulation in the District Court, and the 7-cent fare installed. It ran through the month of March and the result showed a 12 per cent increase in travel and about a 16 per cent decrease in gross revenue. On April 1, under the agreement, the company therefore installed the 8-cent cash fare. It ran through the month of April and resulted in a decrease in travel over the 10-cent rate and, of course, a decrease in the gross revenue accordingly.

A series of meetings was held during May with the City Council in an attempt to adjust the whole dispute, and finally the City Council was advised that as a last proposition the railway would continue the 8-cent cash fare rate until the latter part of August, 1921, if the city released the balance of the money that was in the trust fund and dismissed the litigation. Another condition of the proposal was that at the end of August the 10 cent cash rate

Safety Zone Plan Extended in Los Angeles

Following establishment of a new style safety zone at Seventh Street and Broadway, the busiest point in Los Angeles, Cal., extension of the zone has been ordered by the city.

When the first test was made safety zones were established at the four corners of the intersection 90 ft. long and 4 ft. wide. The zone was marked by white strips painted on the pavement and by chains suspended from stanchions. Entrance to the safety zone was from the front, in line with the property limits.

The zones have been increased in size so that they are now 100 ft. long and 5 ft. wide from the car clearance line. The white-painted strips are to be replaced with white cement strips inset in the pavement. Two chains instead of one, suspended from heavier stanchions, will mark the limits. The zone has room for two cars to load

Transportation News Notes

Increased Fares in Force.—The Ohio Electric Railway, Springfield, Ohio, has placed in effect the new passenger rates authorized by the State Utilities Commission. They are as follows: Columbus to Newark from 90 cents to \$1, one way; to Zanesville from \$1.65 to \$1.80; to Dayton from \$1.75 to \$2.

Another Five-Cent Line.—New rates of fare and method of operation will be put into effect in East Boston and Chelsea commencing on June 18, providing a 5-cent local fare, without free transfers, in those sections, and a dime fare to and from Boston proper. General Manager Dana of the Boston Elevated Railway has announced this change.

Must File Lower Rate.—The Pottsville Union Traction Company, Pottsville, Pa., has been ordered to file a tariff at the commission office allowing four tickets for 30 cents. The present charge is 10 cents with no ticket fare in effect. Commissioner Rilling decided that the rate was "excessive and unreasonable." The company was also ordered to extend transfer privileges on its Minersville and Yorkville divisions. The Pottsville Union Traction Company is owned and operated by the Eastern Pennsylvania Railways.

Three-Cent Fare on Municipal Line.—According to a statement given out by Councilman Oliver T. Erickson a sufficient number of signatures already returned virtually assure a vote next spring on his initiative ordinance for a 3-cent fare on municipal car lines of Seattle. Petitions have been circulated for some weeks by the Public Ownership League to get voters to sign their approval of the initiative ordinance to be put on the ballot at the municipal election. Councilman Erickson states that while enough signatures have been secured, the petitions will continue to circulate as a matter of education for the people in acquainting them with the plan.

Jersey Railway Carries 9,000,000 Passengers.—The report of Robert G. Fleming, assistant city treasurer of Camden, N. J., and Martin Schreiber, general manager of the southern division of the Public Service Railway, shows that the jitneys in Camden carried 1,429,166 passengers from Jan. 1 to May 1. The Public Service Railway has carried approximately 9,500,000 up to June 1. The jitney owners' receipts for the four months totaled \$100,041. Public Service receipts, it is said, equaled \$665,000 by June 1. There are 132 jitneys in Camden. The Public Service Railway carries about 50,000,000 passengers each year on the southern division.



SAFETY ZONE AS ESTABLISHED IN LOS ANGELES

would be reinstalled if the 8-cent rate did not produce a reasonable return on the investment or equal the average return at the 10-cent rate during the five months that the 10-cent fare was in effect.

As previously indicated, the Council on May 31 accepted the proposition but it did not do so until Manager Cass notified the members that if they did not accept it he would install the 10-cent cash fare rate on June 1 and test the matter out in court.

Purchases Equipment—Wins Business.—The Tiffin, Fostoria & Eastern Electric Railway, Tiffin, Ohio, has a contract for hauling about 35,000 tons of stone. The stone quarry is situated adjacent to the company's track. The business was secured by the railway property's purchasing the necessary equipment.

and unload at the front and rear doors and permits the front door of a third car to enter. When traffic is closed, autos must stop in line with the front of the zone.

The plan has proved satisfactory, is speeding up loading of cars and prevents accidents.

Fare Rise in Sault Ste. Marie

The Utilities Commission of Michigan recently issued an order increasing passenger fares on the Sault Ste. Marie Traction Company from 5 to 7 cents, with four tickets for 25 cents. The order went into effect on April 25 and will be in effect until the commission takes a complete inventory and appraisal of the property. The commission in its finding stated that it was convinced that the company was not earning enough money to meet operating expenses.

Personal Mention

M. R. Bump Heads N. E. L. A.

F. T. Griffith, Portland Railway, Light & Power Company, Elected a Vice-President

Milan R. Bump, chief engineer for Henry L. Doherty & Company, New York, was elected president of the National Electric Light Association at the closing session of the annual convention of that organization in Chicago on June 3. Mr. Bump succeeds Martin J. Insull, vice-president of the Middle West Utilities Company, Chicago.

Other officers elected were: First vice-president, Frank W. Smith, United Electric Light & Power Company, New York; second vice-president, Walter H. Johnson, Philadelphia Electric Com-



M. R. BUMP

pany; third vice-president, Franklin T. Griffith, Portland Railway, Light & Power Company, Portland, Ore.; fourth vice-president, J. E. Davidson, Nebraska Power Company, Omaha; treasurer, H. C. Abell, American Light & Traction Company, New York.

The new president is an engineer of broad experience with a sympathetic understanding and appreciation of all phases of the utility business. Milan R. Bump is the fourth member of Henry L. Doherty & Company to become president of the N. E. L. A. Since 1910, except for a few months six years ago when he was vice-president of the Picher Lead Company, Mr. Bump has been chief engineer of the Doherty organization in charge of all engineering and of the construction and operating departments of the public utility division. Later he became a member of the executive committee of the company in charge of the oil transportation, refining and marketing divisions and the natural-gas division.

Mr. Bump was born at Rock Falls,

Wis., March 18, 1881. At the age of twenty-one he was graduated in electrical engineering from the University of Wisconsin. In 1904 he became associated with Henry L. Doherty as the first cadet engineer of the Doherty training schools. He served as engineer on several Doherty properties until 1910, when he came to New York to take up his present duties. During his first five years as chief engineer of the Doherty organization Mr. Bump was engaged largely in examining for purchase and revamping many of the utility properties of the Cities Service Company subsidiaries.

In his work of rehabilitating sick utilities Mr. Bump has become a firm believer in the value of good public relations. It is not surprising therefore to find in him one of the most ardent advocates of customer ownership of public utility securities. He is a thorough student of public utility problems even though they be apart from engineering, and through his executive touch with properties in more than half the states he brings to the N. E. L. A. a well-balanced national point of view that should prove of immeasurable value to the electric light and power industry.

Franklin T. Griffith, third vice-president of the association, is a public utility executive who, for a number of years, has fought for water-power legislation that will permit the economical development of Western power resources.

As an attorney he has made great strides in codifying laws governing the development of water powers, and as president of the Portland Railway, Light & Power Company, Portland, Ore., he has been applying his sympathetic understanding of human nature to smooth the way for the utility in best serving the public. When the national water-power laws were being formulated the experience and advice of Mr. Griffith were widely sought, and he gave largely of his energy in constructive thought on this legislation. Then and since, as chairman of the water-power development committee of the National Electric Light Association, he has untiringly worked to bring about far-sighted interpretations of these laws with workable rules and regulations so that the most beneficial results shall be gained.

H. C. Abell, who was re-elected treasurer of the N. E. L. A., is the chief engineer for the American Light & Traction Company, which is the holding company of the Muskegon (Mich.) Traction & Lighting Company, the San Antonio (Tex.) Public Service Company and many light and gas properties.

Attorney Elected President

Jack Beall to Complete Texas Interurbans Left Unfinished by the Late Colonel Strickland

A brief item published last week announced that Jack Beall, former Congressman from Texas, and for the last six years one of the general attorneys for the Texas Electric Railway and other interests of the late Col. J. F. Strickland, has been elected president of the Texas Electric Railway to succeed Colonel Strickland at the meeting of the board of directors in Dallas on Monday, June 6. At the same time the board created a new position, that of chairman of the board, and elected to this post N. A. McMillan, St. Louis, executive manager of the First National Bank of that city and head of the St. Louis Union Trust Company. Mr. McMillan has been closely associated with Colonel Strickland in financing the building of the interurban lines and also in his other enterprises. Two vacancies on the board of directors were filled by the election of C. G.



JACK BEALL

Comegys, of the city of McKinney, and Burr Martin, Dallas.

Mr. Beall took over his duties as president of the Texas Electric Railway immediately after his election. He has announced that he would carry out the same general policy that Colonel Strickland had followed, and asked the co-operation of all employees of the company. The first important work left unfinished by Colonel Strickland to be taken up by Mr. Beall is the building of the interurban line to Terrell. Work on grading for this line has already begun, and Mr. Beall says work will be rushed and the line completed as soon as possible.

Mr. Beall is a native Texan, having been born a few miles west of Waxahachie on Oct. 25, 1866. He was educated in the country schools of that district and later taught school for several years before he entered the University of Texas in 1886. He was graduated from the University of Texas in 1890, taking his degree in law. He then entered the practice of law at

Waxahachie and was elected to the Texas Legislature in 1892 and to the State Senate in 1894. Mr. Beall was elected to Congress in 1902 and served continuously as representative of the Dallas district until March 4, 1915, when he resigned to take over his duties in the legal department of the Texas Electric Railway.

Appreciation of Mr. Brooks Shown at Testimonial Dinner

Frank W. Brooks, retired president of the Detroit United Railway, was given a testimonial dinner at the Detroit Athletic Club on the evening of June 8. About 600 officers and employees of the company, among whom were present several who have been with the company over thirty years, expressed their appreciation of Mr. Brooks. As tangible remembrances, the employees presented their resigning leader with a grandfather's clock, a diamond ring and an engraved testimonial, which recites Mr. Brooks' personal merit and his efforts in behalf of the company.

Besides selected guests, Elliott G. Stevenson, counsel for the D.U.R.; Alex Dow and John C. Donnelly, directors; Allen F. Edwards, acting president; J. C. Hutchins, chairman of the board, and E. J. Burdick, assistant general manager, were seated with Mr. Brooks.

F. W. Miller has been appointed superintendent of the Hartford Division of the Connecticut Company, the place made vacant recently by Nathaniel J. Scott when he succeeded the late Warren P. Bristol as manager. Mr. Miller has been with the company thirty years and has worked his way up to his present position. John A. Kiely, who began twenty-five years ago as a motorman and was successively inspector and chief dispatcher, has been appointed assistant superintendent. William W. Melaven has been made general barn foreman. These are the appointments of Manager Scott.

Edward C. Connor, who has been chief engineer to the supervisor of public utilities of the city of Dallas, Tex., tendered his resignation on May 1. The resignation was accepted by John W. Everman, supervisor, but an appointment to the vacancy has not been announced. Mr. Connor is one of the best known civil engineers in Dallas and his work as chief engineer to the supervisor of public utilities has covered valuation of the traction company's lines in connection with the company's application for a fare increase, negotiations looking toward the drafting of a new franchise for the Dallas Railway and the carrying out of the commitment of the traction company in connection with the building of another interurban line into Dallas, which was recently begun and which will extend to Terrell. It is rumored that W. J. Powell, former city engineer, will be tendered the place.

W. O. Wood President

Queens County Railway Official Elected at New York Meeting Last Week—Eighteen Years in New York

At its annual meeting at Lake George on June 11 the New York Electric Railway Association elected as president one of the best-known railway men in the country. This is William O. Wood, whose fund of humor is equally well recognized with his ability as a railway operator. Mr. Wood is president of the New York & Queens County Railway, a position which he has held since 1908. He is also vice-president and general manager of the Long Island Electric Railway and the New York & Long Island Traction Company. All of these properties are affiliated with the Interborough group in New York.

Mr. Wood succeeds T. C. Cherry, vice-president and general manager of the Rochester & Syracuse Railroad, as head of the association. Mr. Wood has long taken an active and forward participation in the work of the state body



W. O. WOOD

and his election to the office of president is a recognition of his services and interest in behalf of the organization. During the past year he served as first vice-president of the New York Association.

Mr. Wood began his electric railway experience in 1900 when he was appointed general superintendent of the Rapid Railway in Detroit. From that city he went in 1903 to Brooklyn, where he became superintendent of the elevated lines of the Brooklyn Rapid Transit Company. The following year he was appointed assistant general superintendent of the company. In 1907 he resigned to become associated with the Interborough Rapid Transit Company and for a year was engaged in special work, reporting to President Shonts.

Mr. Wood was born in Evansville, Ind., and prior to being connected with the electric railway industry was for a time with the Louisville & Nashville Railroad, then with the Flagler lines in Florida and later with the Illinois Central Railroad.

Obituary

Judge Ira B. Mills, chairman of the State Railroad & Warehouse Commission of Minnesota, and a former president of the National Association of Railroad & Public Utility Commissioners, died in St. Paul on May 4 at the age of seventy. Judge Mills was the oldest public utility commissioner in the United States in point of service, having been in office since 1893.

James O. Ellis, manager of the Chelsea Division of the Eastern Massachusetts Street Railway, died on June 9. He was 51 years old. He was born in Brooks, Me., Aug. 19, 1869, and began railroading as a driver of horse cars on the Lowell division of the Lynn & Boston, the former name of the Eastern Massachusetts Street Railway. He became an inspector and finally rose to the position of superintendent of the Reading Division. Nine years ago he was made superintendent of the Chelsea Division, succeeding George H. Gray, who was made general superintendent. The Chelsea Division includes lines in Revere, Chelsea, Malden and Melrose.

William W. Magoon, formerly general manager of the Ohio Valley Electric Railway, Huntington, W. Va., and one of Huntington's most prominent citizens, died recently in Kenova. Mr. Magoon went to Huntington about thirty years ago from Vanceburg, Ky., to build an excelsior plant, but later became identified with the Camden Interstate Railway. He was general manager of the Ohio Valley Electric until about five years ago, when he resigned because of ill health. He was also secretary and treasurer of the Blue Jay Manufacturing Company, which is one of the largest overall manufacturing concerns in the world. He was also secretary of the Huntington Credit Men's Association. He was one of Huntington's most active workers and boosters, and he devoted much of his life along those lines.

Edgar M. Graham, consulting engineer in Muskogee, Okla., was killed May 14 in an automobile accident. For more than ten years Mr. Graham was chief engineer of the Muskogee Electric Traction Company. He built during this time about 10 miles of the Webbers Falls Railway. In 1900 he became assistant to Guthrie & Diehl, consulting engineers, Buffalo, N. Y. The following year he went with the New York Central Railroad and then was with the Lackawanna Steel Company for two years. In 1905 he became chief draftsman for the Buffalo & Susquehanna Railway, and in 1907 was made assistant chief engineer. He entered private practice in Buffalo in 1908. Mr. Graham was forty years old. He had long been active in engineering society affairs.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Crossarm Buying Shows Some Increase

Greater Demand May Be Due to Lower Prices—Cut of 10 per Cent This Month

Whether it is due to recent price decreases or not is uncertain but producers report that buying of crossarms shows quite an increase of late. This increase in demand is not noted in the electric railway field, however, as it centers around central station buying. Demand is still far from normal but producers are encouraged that it should show up as well as it does.

There may be some connection between current buying and the price situation for on the first of this month a general cut on longleaf yellow pine crossarms was made amounting to about 10 per cent. Fir crossarms were not affected by the drop. This is not the first price decrease on crossarms this year as a cut amounting to 15 per cent was made on Feb. 1 and another varying from 9 to 15 per cent on March 1. These covered both fir and pine arms.

Stocks are reported to be good with immediate shipments prevailing. Producers are optimistic that the market will open up considerably more during the latter months of the year.

Stocks of Waste Are Not Extra Large

Textile Mill Shutdown Has Curtailed Supply—Prices Are Down, but Buying Shows Little Improvement

With textile mills either shut down or very nearly so for several months past it is doubtful if there is a very great surplus of waste in the country. The raw material of waste is a by-product of these mills and, furthermore, waste manufacturers have held their stocks down in line with current business conditions. At the present time deliveries are immediate but only because demand is low and orders too small to push shipments. There has been a slight improvement reported in the textile situation in New England recently but operation there is still very spasmodic, and it is a question whether or not an increase in demand would not push deliveries on waste.

It seems unlikely that any such increase in buying will materialize for some time, however; not before the last quarter, producers think. The general market situation is quiet with railways buying from hand to mouth and industrial demand, which is usually very considerable, flat. One producer at least reports slight signs of in-

creased activity but others do not confirm this.

Competition is very keen and prices are down accordingly. Within the past month quotations have been lowered one cent per pound at least. Current quotations from several waste manufacturers in lots of 100-lb. bales show on white cotton waste a range of 7 to 12 cents per pound; on colored a range of 5½ to 10½ cents, and on wool waste the price varies from 8 to 17 cents.

Recent Price Cut on Pole Line Hardware Not General

Buying Shows No Reaction, Although Three Reductions Have Been Made This Year—Deliveries Are Immediate

Although one producer of pole-line hardware has just made a 5 per cent price reduction effective June 16, and a large manufacturer's distributor reduced the price 5 per cent about a week ago, there has been no general recent decrease so far as can be learned. Manufacturers in this line have apparently reached the conclusion that price cuts will provide absolutely no stimulus to buying, consequently reductions represent lower costs and nothing more. Three general price cuts have been made since the first of the year and buying has shown little or no reaction. The first cut of 5 to 15 per cent was made in late December and early January, the second of 5 to 7½ per cent on Feb. 15 and the third from 7½ to 10 per cent occurred on April 11.

At the present time there are a few orders and inquiries coming in from central stations but none from electric railways. Stocks have been reduced, one producer who had \$500,000 worth of goods on hand earlier this year having cut this down by one-third now, but deliveries are mostly immediate and not longer than one week at the most.

150 More Cars for Detroit

In line with the tremendous construction program under way on the municipal railway system of Detroit, Mich., the city has advertised for bids on 100 safety cars and fifty double-truck Peter Witt cars. Bids are to close on June 28, the company advises. On Nov. 16, 1920, the railway ordered twenty-five safety cars from the Osgood-Bradley Car Company and on April 15, 1921, purchased twenty-five additional safety cars from the same concern. An order for rails and kindred material which the city placed last month, totaling about \$800,000, was mentioned in the May 21 issue.

Bituminous Coal Production Holds Up Well

Current Average of 8,000,000 Tons Weekly More Than Present Light Demand Can Absorb

Possibility of a shortage of bituminous coal materializing this fall seems more remote in view of the consistent maintenance of current output. For the past four weeks production has proceeded at the rate of 8,000,000 tons per week according to the Geological Survey, or about 2,000,000 tons above the low point reached early in April. Incidentally this rate of output, *Coal Age* states, is considerably more than can be absorbed under present industrial conditions.

Buying has been restricted to the barest needs, though some forward contracts have been closed. Consumers are still holding off under hopes of lower freight rates and reductions in the price of coal, and this policy is encouraged by the facility with which needs can be filled. It is stated that there will be no general reduction on coal freight rates this year, however. The Secretary of Commerce this week gave it as his opinion that nothing will come of the negotiations between the administration and the railroads looking to a reduction of freight rates on coal. There may be local changes, of course, but they will be made only by rate hearings and after considerable delay.

EXPORT BUYING LIGHT, WITH END OF BRITISH STRIKE NEAR

The export market is dull at the present time as purchasing on British account has slumped in anticipation of an end of the coal strike in Great Britain next week. As a result of the weak condition of the steam coal market prices have further eased off recently. The index of spot coal prices of *Coal Age* declined to 95 on June 14, the lowest figure touched this year. This number represents all prices reduced to one figure and compared with the average government price of 1918 which is taken as 100. The first of the year this index number ranged around 130 but since February it has remained in the neighborhood of 100.

Labor costs at the mines are as yet undiminished. All efforts to open discussion with the United Mine Workers for wage reductions have thus far failed and no prospect of a cut in union wages can be seen this summer. Further than that, of course, the situation is uncertain. Meanwhile, non-union coal produced at lower wages continues to offer keen competition to union coal in the eastern market.

New and Scrap Steel Market on Lower Level

Price Reductions of from \$3 to \$5 on New Steel Products Fail to Move Much Material

It is felt that the iron and steel trade is operating on a level that is about as low as it can go. A figure of 25 per cent will just about indicate the rate of operation of Corporation and independents together, a figure 5 points lower than it was a week or two ago. With a generally lower volume of business this past week the general tone of the market is softer and some definite price reductions in certain steel lines have been noted.

Iron bars are off 13 cents a hundred pounds to \$2.25 and in New York the reduction is 15 to 20 cents to \$2.23 to \$2.28. Steel bars at Pittsburgh are holding at 2.10. In the sheets black, Pittsburgh, is down \$3 a ton to 3.85 and blue annealed is down \$4 to 2.90. On plain wire quotations are now 2.75 and on galvanized barbed 3.85 cents, \$5 a ton lower than recent prices. Malleable at Chicago is 50 cents lower at \$22.20 per gross ton while Pittsburgh bessemer is \$1 lower at \$24.96. Prices are being shaded on track spikes, quotations on which are \$3.40 base, Pittsburgh. Base on track bolts is \$4.35, and here too is some shading, probably of \$3 per ton.

Since June 7 the scrap iron and steel market has dropped from 50 cents to \$1. Old steel axles are \$1 lower to \$13.50-14.00 and No. 1 cast is \$1 lower to \$13.00-13.50, all in net tons, Chicago. Old iron axles are steady at \$24-25. In gross ton lots, Chicago, 50-cent reductions have been applied to car wheels, bringing them to \$13.50-14; R.R. malleable, which is now \$13.50-14; frogs, switches and guards, which stand at \$11-11.50; old steel rails, short, which are quoted at \$12.50-13, and rerolling steel rails, \$13-13.50. Buying in this market is extremely quiet.

Insulation Makers Optimistic Despite Light Buying

Good Price Declines of the Past Week Bring Total Decline Since First of Year to Large Figure

Quietness is still the prevailing feature of the electrical insulation market. Repair shops are buying hand to mouth, for most of them are not busy. Industrials are operating at reduced capacity, and furthermore they ordered ahead when deliveries were long so that little buying is being done in that quarter. Electric railways are endeavoring to get along on such insulating material as they have and buy only for immediate needs, and as the appliance industry has been slack for a long time, small motor manufacturers are not active. One of the latter, for instance, recently bought 15 lb. of mica where a normal order formerly totaled 100 lb.

The general outlook is held to be far from discouraging, however. The very fact that motor manufacturers, electric

railways, etc., are not stocking insulation means all the more potential business yet to be placed, and as it seems there is not a great volume of repair work being done insulation needs along that line are piling up. Just when this business will break is, of course, a question, but the majority of producers are not expecting anything much to develop in the way of increased business before the first of September.

Buyers apparently do not yet have confidence in present prices despite the radical reductions which the latter have undergone. Prices are still declining, it is true, but it is possible this is largely a result of conditions of keen competition. Since the first of this year, according to one of the large producers, cotton tapes, webbings and sleeveings have declined 70 per cent, 25 per cent of this drop occurring just this week; varnished cloths have declined about 28 to 35 per cent, one-fourth of which decrease also was made this week; cotton armature twines, except linen, are down 33½ per cent and insulating varnish about 20 per cent. India mica up to the present is undiminished in cost as the price at the mines has not been reduced, but the South American product is now somewhat lower.

Conditions of stock vary considerably, though all producers are pursuing a policy of keeping down inventories and only producing on order. Deliveries of standard material for the most part are immediate, as in general stocks are too large rather than too small under present buying.

Schedule Material Prices Marked Lower Last Week

From about the ninth to the thirteenth of June the various manufacturers of schedule materials increased some of their discounts and lowered certain list prices so that the general result was a decrease in prices averaging around 10 per cent in standard-package quantities. With this general easier price, however, it can hardly be expected that any great amount of business will be stimulated, for the building construction outlet is not yet in a condition to absorb any large amount of schedule material and wiring devices.

Fuse Prices Down 11 to 17 per Cent the Past Month

With the recent price reductions announced on non-renewable fuses by several manufacturers, quotations on both this type and on renewable fuses are now down. Effective the middle of May, leading manufacturers reduced prices on renewable fuses approximately 17 per cent by increasing the discount allowed to distributors 10 points.

Non-renewable fuses were not affected by this drop, however, but the first of this month reductions were made by a couple of manufacturers. Other producers have since then taken similar action, until with further decreases that did not come through until

last week non-renewable fuses may be said to have been generally reduced from 11 to 16 per cent this month.

Hydro-Electric Development Proposed for Jamaica

Plans are under consideration at present for the construction of a hydro-electric plant in Jamaica, to cost about £614,740. The present plans provide for a 6,000-kw. development, to include the erection of three power stations equipped with a water turbine directly connected to a three-phase alternating-current generator. Transmission will be both by underground cable in one section and by overhead lines to a main line along the railway. The project also includes the electrification of the railways on the island.

Franchises

Galesburg Railway, Lighting & Power Company, Galesburg, Ill.—The Galesburg Railway, Lighting & Power Company has been granted a franchise to construct, maintain and operate a street railway on South Henderson Street from Knox Street to Monmouth Boulevard. The new franchise will help the company to connect its inter-urban lines. Work on the new extension has already been started.

Track and Roadway

Tri-City Railway, Rock Island, Ill.—The Moline City Council has instructed City Attorney James M. Johnston to petition the Illinois Public Utilities commission to issue an order compelling the Tri-City Railway to put in new tracks on Fifteenth Street from Eighth to Twenty-fourth Avenues, so that the city may advertise for bids for the paving of the street with brick, with the assurance that the railway will not hold up the work, by refusing to put in new rails.

Southern Indiana Gas & Electric Company, Evansville, Ind.—An agreement has been reached by the Southern Indiana Gas & Electric Company at Evansville, Ind., with the city whereby the company will improve three streets in that city, according to a recent announcement of Mayor Benjamin Bosse, of Evansville.

Interstate Public Service Company, Indianapolis, Ind.—The Indiana Public Service Commission has refused to declare unreasonable an ordinance passed by the city council of Shelbyville ordering the Interstate Public Service Company, Indianapolis, Ind., to make improvements and extensions. The company has appealed to the commission to disapprove the ordinance.

Public Service Railway, Newark, N. J.—The Public Service Railway has been asked by the City of Burlington, N. J., to lower its tracks through the entire city in order that street paving might be started. The work of lowering the tracks will require some time.

Interborough Rapid Transit Company, New York, N. Y.—The new Rapid Transit Commission, New York, N. Y., is preparing plans for the extension of the Queensboro subway from Gilroy Avenue and the Willets Point Boulevard, Corona to Main Street, Flushing. The Board of Estimate has already authorized the extension of the Corona line from the present station at Alburtus Avenue, Corona, to the new storage yards.

Columbus, Delaware & Marion Electric Company, Columbus, Ohio.—The Columbus, Delaware & Marion Electric Company has secured permission from a majority of property owners in Indianola Avenue to lay double tracks for a distance of 800 ft. to Oleanthy Street. The Council is expected to act on a 20-year franchise ordinance permitting the work.

Johnstown & Somerset Railway, Somerset, Pa.—Work will be resumed on the construction of the Johnstown & Somerset Railway which was suspended during the war though six miles had been completed. The line has been operating for a year. In view of the reduced cost of material and labor the board of directors has decided to push the project through. Four miles from Holsopple to Jerome will be finished within 90 days. Engineers are busy now on the line from Jerome to the Lincoln highway via Boswell.

Montreal (Que.) Tramways.—The Kelly Street extension of the Montreal Tramway service will be completed shortly, and the new service from Ahuntsic station to the Canadian Pacific Railroad at Bordeaux will be commenced early in June.

Tacoma Railway & Power Company, Tacoma, Wash.—Frank R. Spinning, acting earning basis, and that the city State Department of Public Works, has announced that he will do all within his power to see that the College of Puget Sound is provided with street car service, urging that the line be obtained by friendly and co-operative means. The Tacoma Railway & Power Company, through Manager Richard T. Sullivan, proposed that the company will build the extension, if the city will remit gross earnings tax to the amount of any deficit that occurs in the operation of the line, figured on an 8 per cent earning basis; and that the city relieve the company of its paving obligations on Portland Avenue when that street is paved. Mayor C. M. Riddell pointed out that the city chapter absolutely prohibited the Council from agreeing to any such proposition.

Power Houses, Shops and Buildings

Terre Haute (Ind.) Traction Company.—The Terre Haute Traction Company is preparing to ask the Public Service Commission for permission to finance a \$500,000 enlargement and extension of the Water Street power house. The report adds that an im-

posing \$200,000 traction terminal for Terre Haute is also in mind, for which plans have been prepared some time. Under a recent grant of increased rates the company contracted to spend all of the additional income provided in betterments. The new power generating machinery here will be the first step toward complying with this contract, and the terminal station will come along soon after.

New York, Westchester & Boston Railway, New York, N. Y.—Plans are expected to be filed with the Public Service Commission of New York by the New York, Westchester & Boston Railway providing for establishment of a new terminal at 129th Street and Third Avenue, which will cut 15 minutes off the running time between Westchester villages and downtown New York. A through express service to lower Manhattan will be available under the plan by connection with the Third Avenue L at 129th Street.

Trade Notes

The Clark-Hunter Company, Inc., 161 Summer Street, Boston, is now manufacturing the Duwell motor-driven bench grinders at its Worcester factory.

The American Metal Molding Company, Newark, N. J., is now producing a full line of conduit elbows in addition to its flexible armored conductor and metallic flexible conduit. Sufficient factory capacity also is available to turn out special press work for the commercial trade.

The Schiefer Electric Company, 614 City Bank Building, Syracuse, N. Y., has been appointed to represent the Condit Electrical Mfg. Company, Boston, Mass., handling its complete line in the vicinity of Syracuse and the eastern part of New York State exclusive of New York City.

Power Specialty Company, 111 Broadway, New York City, manufacturer of Foster superheaters, economizers, and oil stills announces that it is just completing the expenditure of about one-half million dollars in the enlarging of its works, including new steam power plant and new forge shop.

The Westinghouse Electric & Manufacturing Company has announced the opening of its service department and repair shop at 1535 Sixth Street, Detroit. It is a five-story building and similar to the sixteen buildings erected in the principal industrial centers of the United States for repair purposes. The new repair shop is equipped to handle the designing and manufacture of all types of switchboards in the same way as they would be handled at the main works, and in addition dipping tanks and baking ovens are available. Stocks of repair parts are carried. The company's engineering organization, it is stated, is prepared to install or repair electrical or steam apparatus on the owner's premises.

Ohmer Fare Register Company, Dayton, Ohio, states that there is a con-

tinuously increasing demand for Ohmer register service on city lines. Among recent large contracts placed with the company is an order from the Georgia Railway & Power Company, of Atlanta, Ga., for equipping its entire city property with 418 Ohmer No. 3 type, time-feature, totalizing registers and rapid transit operating equipment. This corporation has also given to the Ohmer Company other contracts for equipping its interurban divisions with registers. The Shreveport (La.) Railways Company has likewise placed a long-term contract for the installation of 44 No. 3 type, time-feature, totalizing registers with rapid transit operating equipment for use on all of its city lines.

New Advertising Literature

Steam Separator.—The Griscom-Russell Company, 90 West St., N. Y. City, has issued bulletin No. 1140 describing its "Stratton" steam separator.

Damper Regulator.—The Atlas Valve Company, 282 South Street, Newark, N. J., has issued bulletin No. 5, describing its Victor damper regulator No. 3, high-pressure.

Headlights.—The Electric Service Supplies Co., Philadelphia, Pa., has issued a limited number of copies of its new engineering report, No. 351, on glass reflectors for headlights.

Electric Drill.—The Louisville Electric Manufacturing Company, Louisville, is distributing a circular covering its No. 3, two-speed, and No. 2, single-speed "Universal" electric drills.

Arc Welding.—"Electric Arc Cutting and Welding by Alternating Current" is the title of a new fifty-two-page publication of the Electric Arc Cutting & Welding Company, Newark, N. J.

Belt Conveyor Idler.—C. W. Hunt Engineering Corporation, 143 Liberty St., N. Y. City, has issued a folder describing its new self-aligning, all-steel, troughing, belt conveyor idler.

Bench Grinder.—The Clark-Hunter Company, Inc., 161 Summer Street, Boston, is distributing a four-page leaflet describing the "Duwell" motor-driven bench grinder.

Electric Welders.—Bulletin No. 1 issued by the American Electric Fusion Corporation, 1906 North Halsted Street, Chicago, describes its type "VW" vertical welders.

Multi-Phase Renewable Fuse.—The Federal Electric Company, Chicago, has developed a multi-phase time-limit renewable cartridge fuse designed to prevent polyphase motors running single-phase.

Electric Hoists.—The Electric Hoist Manufacturers' Association, 165 Broadway, N. Y. City, has issued an illustrated bulletin on "Approved Applications of Electric Hoists," with a separate bulletin inclosed entitled: "Monorail Runway Construction."

"There is a PEACOCK BRAKE

for every
type of Car"



Look at the Drum, Gentlemen!

THE DRUM is the all-important point on any handbrake—notably on PEACOCK IMPROVED BRAKES. The drum on these Brakes is not the product of some hasty design, or a copy of some other model.

The drum on Peacock Improved Brakes—each different type of drum—is the result of *years* of experiment and experience. It is carefully worked out to suit given conditions of braking service.

When we so place the eccentric upon the drum that the chain winds up, or down, (as the case may be) rest assured that the eccentric

is placed there because we KNOW that it will best meet certain conditions.

When we place the AUTOMATIC STOP at a certain point on the drum pinion

—and provide three places for attaching the chain to the eccentric

—those features, too, are the result of carefully worked out design based upon Peacock Experience.

So much depends upon handbrakes that it pays to be over-cautious in their selection. So we say—study well the design of the brakes you have in mind—and your choice will be PEACOCKS.



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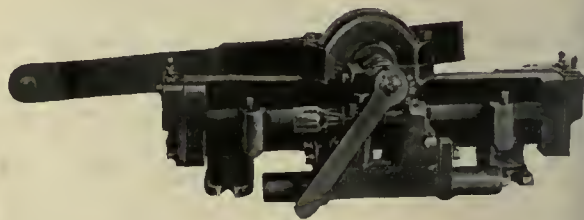


7700 CONSOLIDATED DOOR ENGINES

have been installed on the New York Municipal Railway.

Think of it! 300 new Subway cars—the largest order in years—now under construction. All will have Consolidated door engines—4200 of them.

Why? Ask us.



Door Engine

CONSOLIDATED CAR-HEATING COMPANY

ALBANY

NEW YORK

CHICAGO





*—not all passengers
are careful*

ALL railway seats suffer the same ill-treatment; men *will* put their feet on them; they *will* set heavy, sharp-cornered luggage upon them.

This means a short life for the upholstery—unless it is made of a washable, scuff-proof and tear-proof material like Craftsman Fabrikoid.

Fabrikoid upholstery has a smooth, flexible, tough finish which is extremely hard to scratch or scar, which is not stained by grease or dirt, and which is completely sanitary. It may be washed with soap and water as you wash the rest of the car—and just as often.

But with all its serviceable, wear-resisting features, Fabrikoid is comfortable—for it is pliant and soft under all conditions. From any angle it is the ideal upholstery for passenger cars.

Fabrikoid is made in many grains and fadeless colors. One of the most popular types for upholstery is the rattan pattern, illustrated. There are other types of Fabrikoid specially developed for car curtains. They also have all the Fabrikoid qualities mentioned above.

Complete details and samples will be sent upon request.

E. I. du Pont de Nemours & Co., Inc.

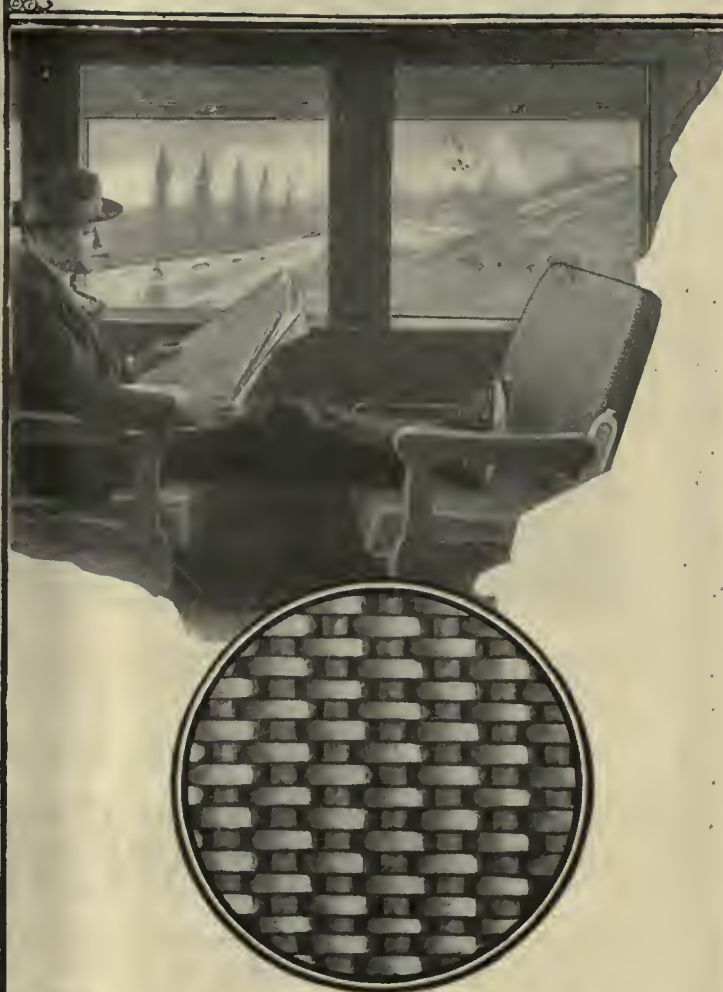
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Wilmington, Delaware

Branch Offices:

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Fabrikoid is also supplied for car curtains in materials that are beautiful, long lasting and cleanable—made in a variety of attractive patterns in unchanging, fast colors.

FABRIKOID



A street railway shop in Missouri completing the construction of crossings and compromise joints by means of the Thermit Welding Process

The Advantages of Making Special Work by the **THERMIT WELDING PROCESS**

are obvious when one realizes that frogs, crossings and even rather elaborate pieces can be completed if necessary in a day or two by using simply the rail which you have on hand, your own track labor and the Thermit outfit and materials, and that this will result in special work which will not only have most of the advantages of the most expensive made but also certain additional advantages.

The Thermit welds will be stronger than the rail itself, and the resulting special work more flexible and lasting than that in the making of which heavy masses of cast iron are used.

It is true that the parts subject to pounding and shock are simply rail steel, but by most engineers this is now considered to be an advantage in that any damage to the points, etc., can be repaired by the addition of metal by means of the electric welder; and it is a peculiar fact that this tough rail steel, an integral part of the entire special work withstands this pounding and shock to a surprising degree.

Let us send you a Thermit outfit at once and let our experienced track engineers instruct your men in constructing a Thermit crossing.

Send for our latest Rail Welding Pamphlet 3932.

METAL & THERMIT CORPORATION

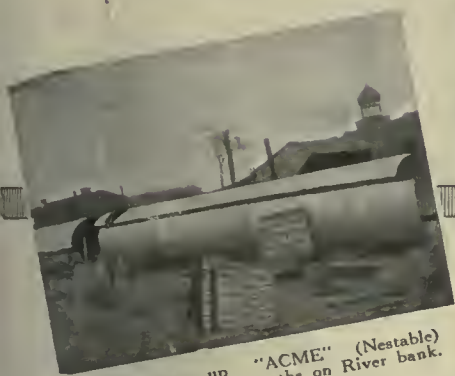
Boston
Pittsburgh
Chicago

120 Broadway



New York

Toronto
S. San Francisco



1. Setting up "ACME" (Nestable) Culvert in 50-ft. lengths on River bank.



6. Divers installing "ACME" Culvert Intake in ditch under Connecticut River.



2. Filter Crib before sinking, showing section of "ACME" Culvert in place.

Installed under the Connecticut River

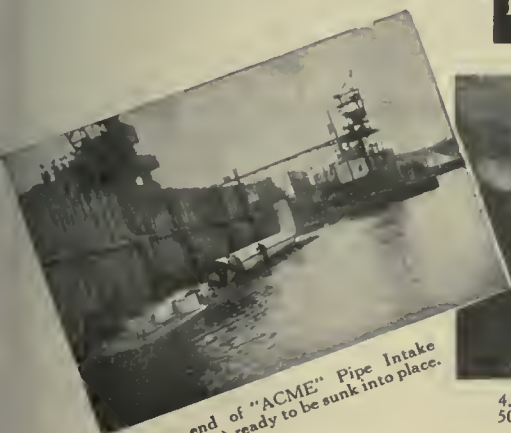
"ACME" (Nestable) Corrugated Culverts are made primarily for use under railroads and highways. Yet because of their sectional construction, they are also practicable for many other uses, such as Intakes, Outlets, Irrigation Ditches, Conduits, Casings for Cables, Gas Mains and Water Pipes, Collapsible Forms for Piers, Rough Flumes, Centering for Concrete Arches, etc. Here, for example, 60-inch

"ACME" (NESTABLE) CORRUGATED METAL CULVERTS

were successfully used as an Intake Pipe in connection with a giant filter-crib 500 feet from shore on the bed of the Connecticut River. The sectional construction made installation easier through the convenience of setting the culvert up in 50-ft. break-joint lengths on the river bank. These 50-foot lengths were transported on a scow to the point of installation and then lowered to the bottom of the river where divers bolted them together. Due to the construction of the "ACME" this pipe line was made practically water, air and sand-tight by caulking the lateral and longitudinal joints with ordinary slater's cement.

Many of the other uses to which "ACMES" are put are shown in an interesting manner in our 48-page catalog. Send for your copy.

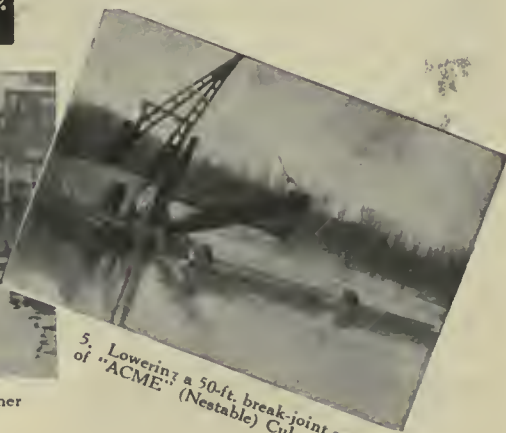
THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.



3. Shore end of "ACME" Pipe Intake (120-ft. section) ready to be sunk into place.



4. Diver about to go under to bolt together 50-ft. sections of "ACME" pipe.



5. Lowering a 50-ft. break-joint section of "ACME" (Nestable) Culvert.



Using the R-W-B Dynamotor for repair work in the shop

Everywhere—on the Line and in the Shop

Everywhere on their systems Electric Railway Companies use the R-W-B Dynamotor—on the line for repairing broken rails, worn crossovers, building up cupped rails; for welding fish plates by the Lincoln Carbon Arc Process; for welding Lincoln Bonds to the rail; and for innumerable jobs in the shops—gear cases, shafts, car wheels, etc., etc.

The many uses of the R-W-B Dynamotor—its great convenience—and surprising economy have caused its adoption by a great number of electric railways, both large and small.

We have some data you will find interesting

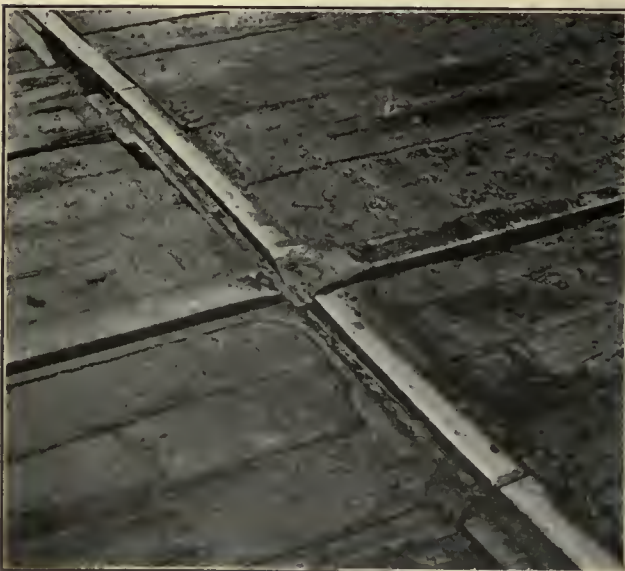
RAIL WELDING AND BONDING COMPANY

Cleveland, Ohio

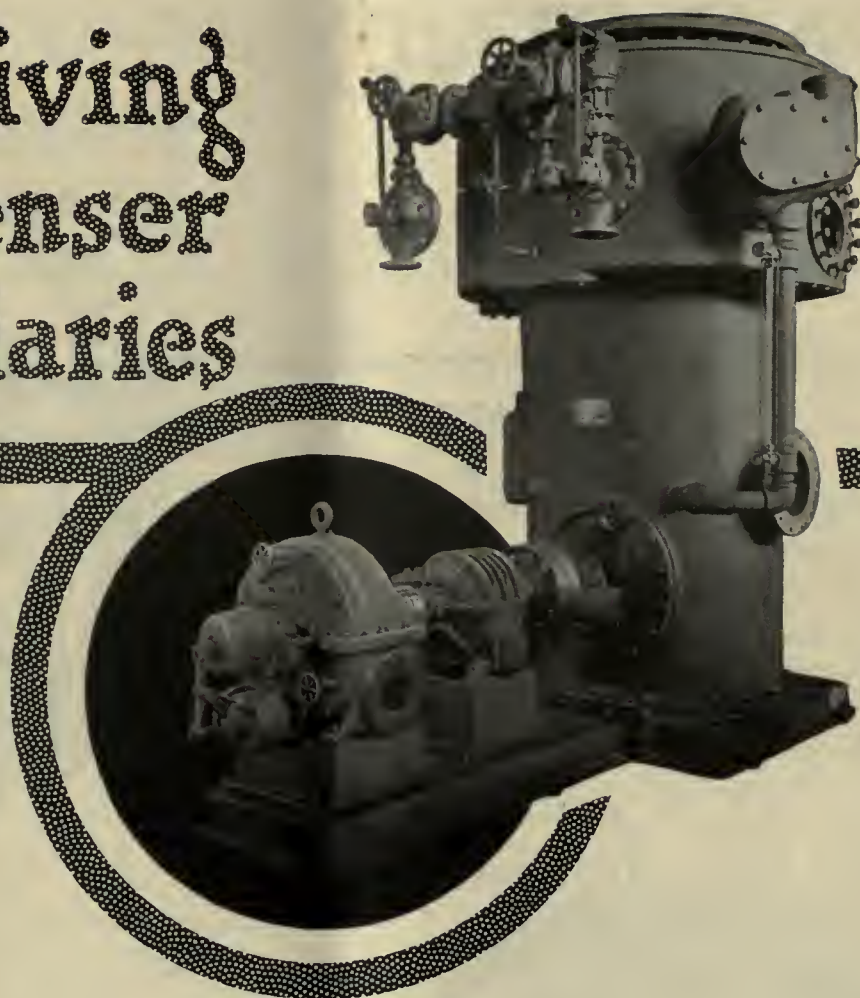
London Representative:
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Crossover repaired by R-W-B Dynamotor



For Driving Condenser Auxiliaries



IN any auxiliary drive dependability of operation is of paramount importance. Terry turbines receive their energy directly from the boiler, avoiding the cycle of main unit, generator, switchboard, fuses and wiring required by motors. They are therefore free from all external disturbances except boiler failure.

Extreme simplicity of construction reduces internal disturbances to a minimum, a fact proved in over 8,000 installations in successful operation.

For your removal pump, injector pump, circulating pump or hot well pump unit, you will be assured dependable service if you

specify

THE TERRY TURBINE

T-735

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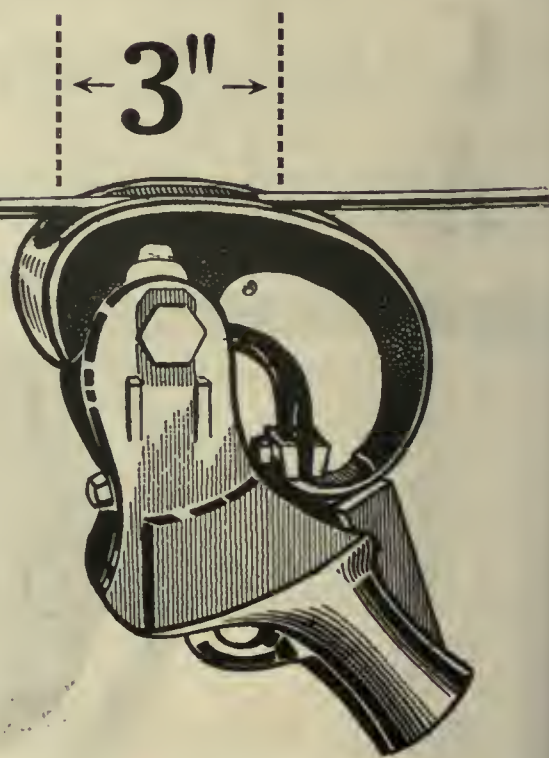
The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.

ARCING

VS

FRICITION

Perhaps electric railways would be quicker to modernize their current-collection systems if they actually analyzed the causes of wire wear which is no small factor in maintenance. Instead of tracing wear largely to *friction*, careful investigation will show you that *arcing*, with its inevitable rust-like deterioration of both wire and trolley wheel, is the real enemy to trolley wire life.



One of the cars of the Portland-Lewiston Interurban
Equipped with Miller Trolley Shoes

Actual micrometer measurements of the wire on the Portland-Lewiston Interurban Railway were made at regular intervals, at a dozen points within 10 inches of the ears. They showed that after four months there was no visible wear at nine points, and less than .001 inch wear at three others!

The greater contact area of the Miller Shoe (three inches) not only "dilutes" friction by distributing it over greater area, but by its permanent, non-jumping grip on the wire, *prevents all sparking.*

We simply ask you to let us submit some plain facts on trolley shoes which will save you money.

Miller Trolley Shoe Co., West Newton, Mass.

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Portland, Oregon

Dharee

Barber shop methods among the Moslems are just the reverse of our own; a man gets his head shaved and orders the hair tonic applied to his beard, or *dharee*.

No Moslem considers himself well-groomed unless his head looks like a croquet ball and his *dharee* is heavy enough to strain eight gallons of rice soup through without rinsing, a luxuriant cootie retreat which often gives the wearer the appearance of a pineapple cheese peeping out of a bed of parsley.

Correctness in personal adornment, however, seems to be largely a matter of geography. You can wear a silk topper in Picadilly, a ring in your nose in Somaliland, or a ball and chain in Sing Sing. Each is harmonious in its particular environment.

It's about the same with commutators.

No one brush can suit all kinds of operating conditions. Many types of brushes are needed for many types of work, the main problem being to find the type that is needed.

In this work Morganite engineers are highly trained specialists.



Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

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- R. W. Lillie Corporation, 176 Federal Street, Boston, Mass.
- W. R. Hendey Co., Hoge Bldg., Seattle



- Herzog Electric & Engineering Co., 150 Stewart St., San Francisco
- Charles Farnham, I. W. Hellman Bldg., Los Angeles
- Railway & Power Engineering Corporation, Ltd., 131 Eastern Ave., Toronto, Ontario, Canada



"Bound Brook" Oil-less Trolley Wheel Bushings are now used by two-thirds of America's electric railway systems.

Reduce Trolley Wheel Maintenance

ELECTRIC Railways throughout the country are facing the problem of maintaining their equipment with little money. New ways must be found to offset the decreased revenues.

In cutting maintenance costs, why not start with the trolley wheel? The constant expense of adjusting and replacing worn-out trolley wheel bushings can be practically eliminated by proper lubrication.

Trolley wheels are no more serviceable than their bushings, and

only those bushings are efficient that function so perfectly as to eliminate maintenance entirely.

"Bound Brook" Oil-less Trolley Wheel Bushings are the successful barrier to neglect. Packed solid in a lattice grooved core, their specially prepared fine graphite provides the lubricating cushion—the positive protection for the life of the bushing itself.

Protect the life and usefulness of your trolley wheels. See that they are all equipped with the genuine "Bound Brook" Oil-less Bushings.

Bound Brook Oil-less Bearing Company

Specialists in the manufacture of Oil-less Bushings for more than a third of a century.

Bound Brook,

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Detroit Office: 1723 Ford Bldg.

BOUND BROOK

OIL-LESS TROLLEY WHEEL BUSHINGS



Car Shop Efficiency and Lubrication

IT goes almost without saying that the more efficiently a car shop is operated, the more cars will be kept on the road. Supervision of the work in the shop to keep men and machines working at full capacity is the golden rule.

But the machine must be in a position to respond fully. There is where correct lubrication—the Texaco kind—enters. We say the Texaco kind advisedly, for we have the proof—the only proof that counts—RESULTS—to back this up. Texaco shop lubricants have a record of performance in shops of all kinds, and numbers of builders of machine tools and equipment, such as lathes, planers, boring mills, drills, presses, cranes, etc., recommend Texaco Lubricants, because they are satisfied that Texaco will aid the showing of the machines they make and sell.

Supporting and enhancing the excellence of Texaco Shop Lubricants is the service of Texaco Lubrication Engineers.

Our staff includes experts on shop lubrication, who will make a survey of your shop and tell you which Texaco Lubricant to use for the various machines and parts.

Through efficient recommendation it is more than likely that they will be able to show you how to do the work with fewer lubricants.

This is helpful in more ways than one. It decreases the chances of confusion; it decreases the storage space necessary; it simplifies orders on the Supply Department for oils; it assists in the better operation of machines through standardization of methods of selection and application of lubricants.

Let us assist you in securing topnotch shop efficiency through correct lubrication. Some of our shop lubricants are:

For General Machine Lubrication....Texaco Machine Oil

For Lubricating Cutting Tools..... $\left\{ \begin{array}{l} \text{Texaco Cutting Oils} \\ \text{Texaco Soluble Oil} \end{array} \right.$


For Gears of Machine Tools.....Texaco Crater Compound
Nos. 1, 2 and 5.

There is a Texaco Lubricant for every purpose.



THE TEXAS COMPANY
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OFFICES IN PRINCIPAL CITIES



T. S. Q. means this 

W. L. DOYLE, RECEIVER OF

**Northampton-Easton &
Washington Traction Company**
Easton, Pennsylvania



MARCH
ELEVENTH
1921

The Tool Steel Gear & Pinion Co.,
Station P. Cincinnati, Ohio.

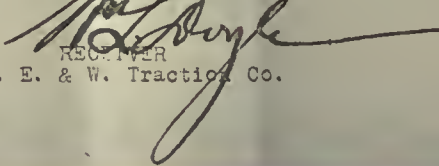
Attention Mr. E. S. Sawtelle, Ass't. Gen. Mgr.

Gentlemen:

Your letter of March 9th. At the time we gave you the first order for Pinions we were influenced by your stated claims. We believe the statements were founded on records of performances and that these performances could be duplicated. Our experience has proved that our beliefs were well founded and your claims based on facts. ((((

You are at liberty to use our previous letter, and our regret is that we cannot make the testimonial stronger and more in detail. We have a very good reason in addition to this for promising to send you our small volume of business, which you probably have no doubt forgotten by this time, and that is that during the period of your strike and when other companies were five, six, seven and eight months behind with their deliveries, you gave us satisfactory service in answer to our rather insistent appeals. This is another reason which enables us to class you among our friends, and we may hope to be numbered among us during the time that we may purchase Street Car Equipment.

Very truly yours,


RECEIVED
N. E. & W. Traction Co.

WLD:N

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

BOYERIZE

to get Waste Motion
and Waste Air Out
of Your Braking



ONCE more, and finally, we direct your thought to those articles on brake rigging by H. M. P. Murphy—this time the sixth and last in the June 18 issue called “Piston Travel and Shoe Clearance.”

Mr. Murphy shows plainly how undue wear causes longer piston travel. Longer piston travel not only causes wasteful use of air but also delays the safe and effective operation of the brakes.

We know of one proved way to keep your piston travel to a minimum in lost

motion and wasted air, namely, the 100% use of

BOYERIZED Pins and Bushings

Which are strong enough to give much longer and immensely safer service with the shortest practicable system of brake levers.

And with “Stag Brand” manganese brake-shoe heads at the *business* end of your brake-rigging, you will be playing safe from cylinder to brake-shoe.

Here Are Other Boyerized Long-Life Specialties *Get 'Em All*

- Boyerized Brake Hangers
- Boyerized Brake Lever Pins and Bushings
- Boyerized Wearing Plates between the Bolster and Bolster Carrier
- Boyerized Wearing Plates between the Pedestal Straps and the Journal Box
- Boyerized Pins and Bushings for door fixtures

Bemis Car Truck Company, Springfield, Mass.

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is an assurance of eventual economy.”*



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EVERY NELSONVILLE BRICK



*Perfectly
Aligned*

**Permits Use
of "T" Rail
with
No Kickups**

Laid without grouting these bricks absorb vibration and shock.

High priced girder rail is unnecessary—

"T" rail and Nelsonville Brick will do the job—and give a tight, level pavement.

This brick lasts longer and reduces track construction costs.

Let us show you our figures.

THE NELSONVILLE BRICK CO.
Nelsonville, Ohio

Consider the
Value of the
TIME SAVED
by
BAYONET
Trolley Equipment



10

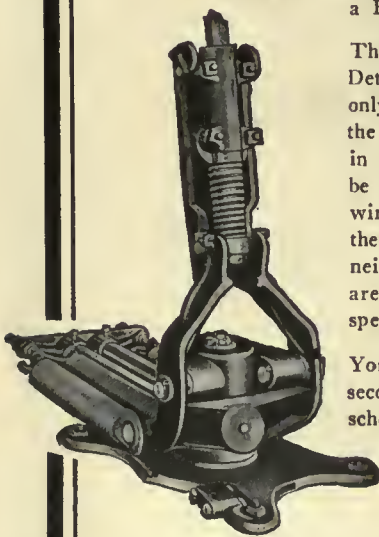
Seconds

are all the time required to change a Bayonet Trolley Harp or Wheel, or substitute a Bayonet Sleet Cutter.

The Bayonet Trolley Base with Detachable Pole Clamp is the only trolley base made on which the trolley pole can be changed in 30 SECONDS and the wheel be in perfect alignment with the wire, no tools required to do the job. And remember that neither safety nor durability are in any way sacrificed for speed.

You know how valuable those seconds are when headway and schedules are to be maintained.

Bayonet Equipment is sold subject to approval. It's the surest step you can take toward economy-plus-efficiency.



Bayonet Trolley Harp Co.
Springfield, Ohio

WHEN YOU SPECIFY LUMBER FOR
CROSSARMS,
TIES,

FENCING, TRUNKING AND CAPPING or any of the hundred and one things that a railway uses lumber for, just bear this important fact in mind:

The cost of the material is generally a small item as compared with the cost of labor for installing it.

When you specify and use ALL-HEART

CYPRESS

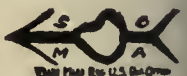
"THE WOOD ETERNAL"

for such purposes you know that it is going to give service for a long time, and that you are *not* going to be up against a continuous big *labor cost* for renewals and replacements.

Of course even Cypress may eventually have to be replaced. Nothing lasts quite forever. But in the long service life you get from Cypress you will have *saved* a lot of labor costs in *maintenance alone*.

Anyway, that's why a number of the biggest railways in the country *insist* on ALL-HEART CYPRESS.

"BUY BY THE CYPRESS ARROW."
LOOK FOR THIS MARK ON THE END OF EVERY BOARD—AND ON EVERY BUNDLE.



Our data is at your service.

SOUTHERN CYPRESS MFR'S ASS'N.

1265 Perdido Building, New Orleans, La., or
1265 Heard National Bank Building, Jacksonville, Fla.

THE U-RE-LITE



A modern Circuit Breaker to meet modern conditions. An I-T-E Circuit Breaker in a steel box: so much better than a fused switch that it is in a class by itself.

It opens instantly on the occurrence of a short circuit or a predetermined overload and can be as instantly reset, but it cannot be closed if the overload continues on the line.

IT DOES AWAY WITH THE CONSTANT EXPENSE AND THE DAMNABLE ANNOYANCE DUE TO THE USE OF FUSES, FOR THE CRY "FUSE BLOWN" MEANS IDLE MEN. It greatly diminishes the possibility of fire from electrical causes and affords positive protection to employees as well as to light or power circuits.

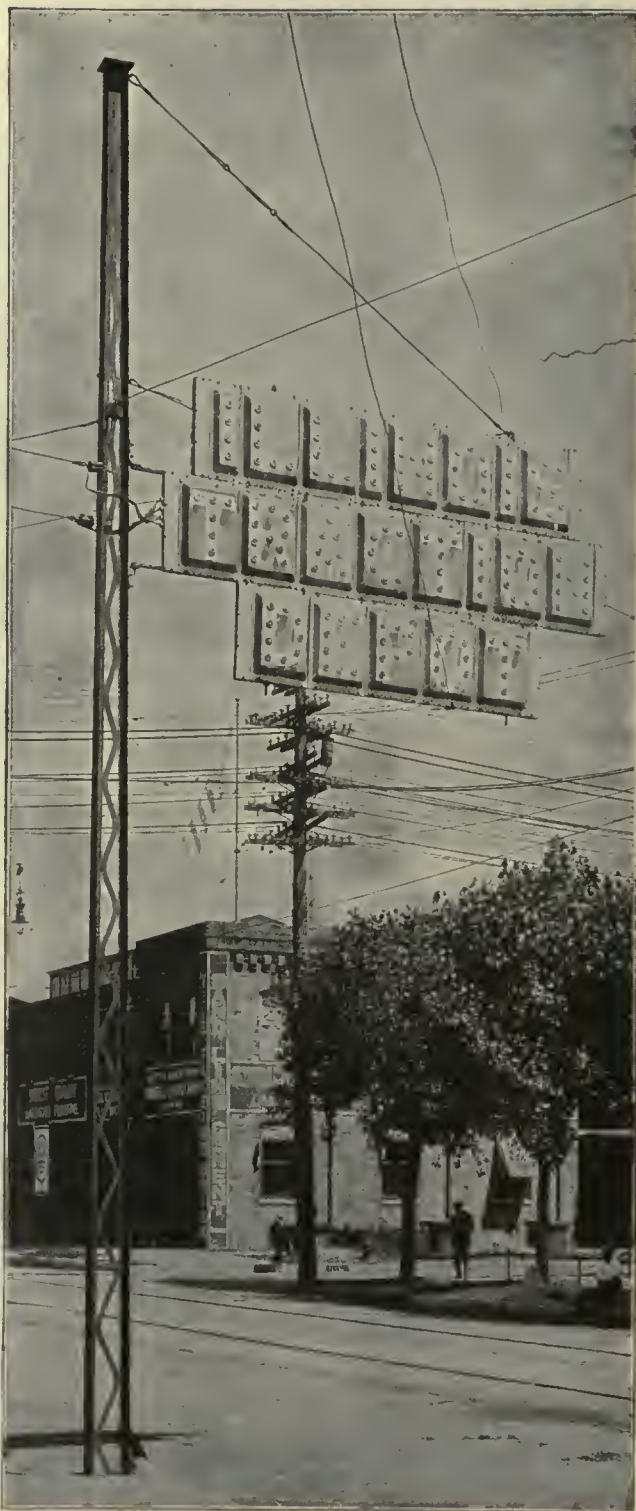
Made in capacities of 60 amperes and under for D.C. circuits of 250 volts or less and A.C. circuits of 250 volts or less, single phase.

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*First to the left,
Then to the right,
Turn the handle
And U-RE-LITE.*

LITERATURE UPON REQUEST

The Cutter Company
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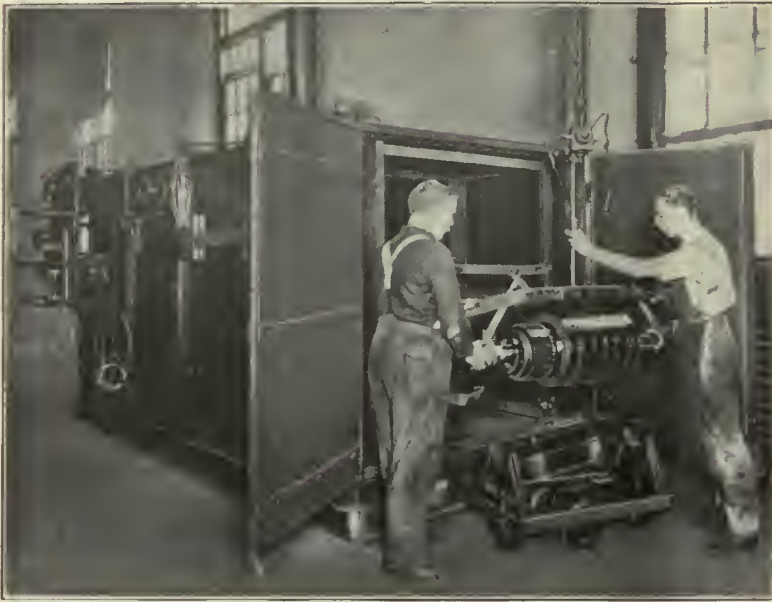
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Returning
July 1

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June 26th to July 1st

Schedule of S. S. South American:

Central Standard Time

Leave Chicago..... June 26, 8.30 A.M.

Leave Toledo..... June 28, 11.00 A.M.

Leave Detroit..... June 28, 3.30 P.M.

Arrive

Benton Harbor..... July 1, 8.30 A.M.

Arrive Chicago..... July 1, 1.00 P.M.

Fare, Including Meals, Berth and War Tax

Chicago to Toledo and return... \$70.00

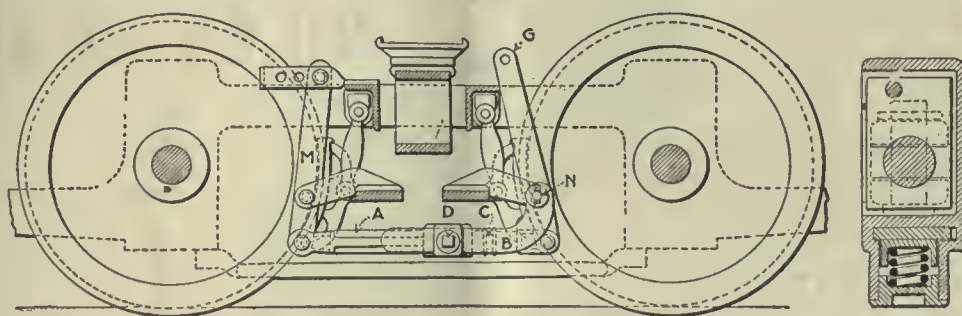
Toledo to Benton Harbor 35.00

Toledo to Chicago..... 37.00

Children 5 to 12 yrs. of age, half fare.



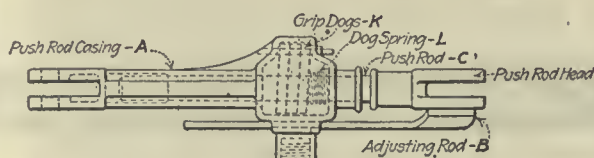
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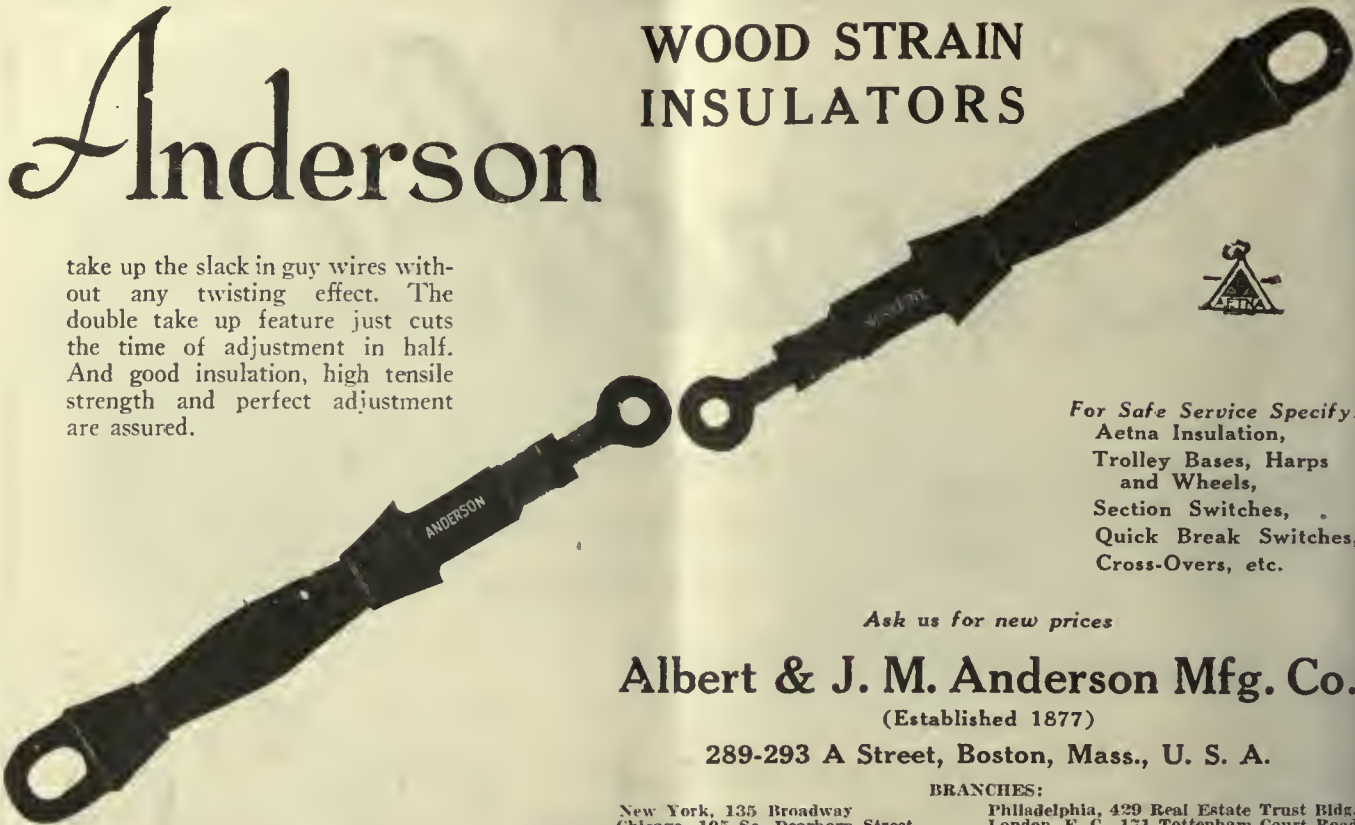
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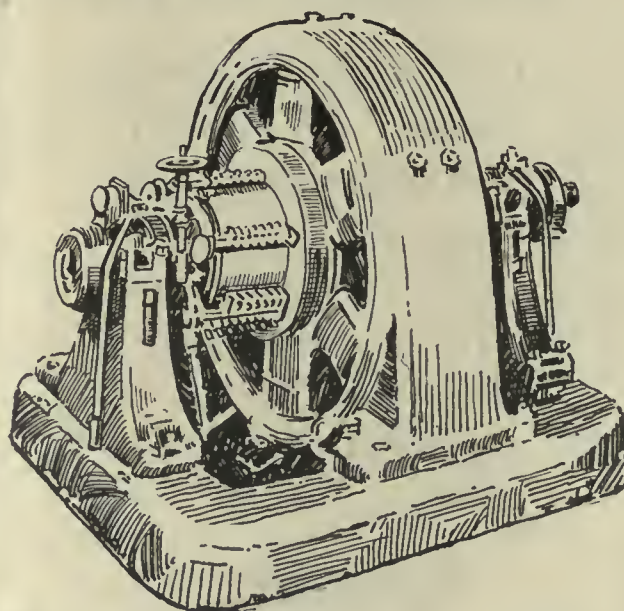
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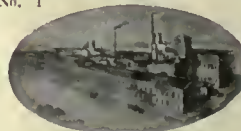
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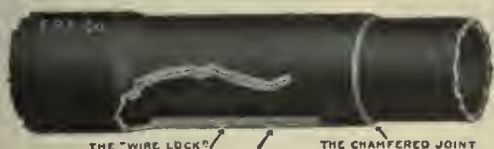
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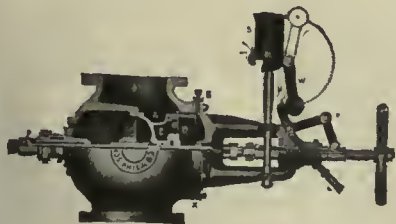
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for Special Service

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Railway Sales Dept. 601 Canal Rd., Cleveland.
Factories, Sales Offices and Warehouses in
all principal cities

LaFRANCE SAFETY DEVICES FOR EVERY INDUSTRY

**Obnoxious dust and fume conditions
afford no inconvenience for workmen
wearing LaFrance respirators**

A complete survey of industrial gases, fumes and dusts preceded the marketing of LaFrance Respirators and Masks.

The one illustrated (No. 1300) is for dust and light fume conditions. It is of the sponge filter type. The sponge is moistened with water or dilute chemical as necessity requires, which serves as the absorbent. This sponge is so arranged that the liquid cannot drop or run into the wearer's face. The respirator is equipped with an adjustable rubber air cushion which insures a comfortable and at the same time tight fit.



Our Safety Devices Catalogue, in addition to giving full information on breathing protection, illustrates and describes the LaFrance line of Safety Signs, Goggles, Masks, First Aid Equipment, Rubber Gloves, Asbestos Gloves, Fireproof Electric Lanterns, Steel Grip Gloves, Fire apparatus, etc. Send for it.

AMERICAN LaFRANCE FIRE ENGINE COMPANY, INC.

BRANCHES: NEW YORK, PITTSBURGH, ELmira, N. Y., PORTLAND, ORE., LOS ANGELES, CHICAGO, DENVER, DALLAS, SAN FRANCISCO, WASHINGTON, CANADIAN FACTORY, TORONTO, ONT.



ASBESTOS CLOTHING • FIRST AID EQUIPMENT
RESPIRATORS • GOGGLES • RUBBER GLOVES
MASKS • SAFETY SIGNS • ELECTRIC LANTERNS



Reduced

*It makes a superior shellac
for repair work.*

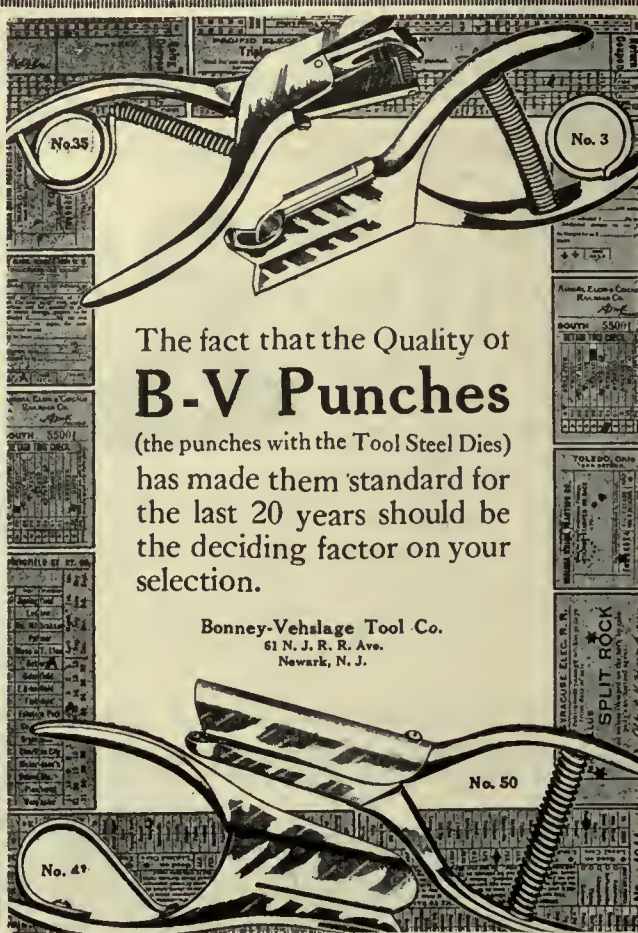
Adding 40% of good denatured alcohol to the gallon of Don-O-Lac high test insulator gives you a coater for car interiors that you'll appreciate. Knowing this you can even save on the costs of ordinary shellacs. Don-O-Lac insulator reduced is less expensive, it does the work every bit as well—and it constitutes a standard material for insulating as well as shellacing.

Don-O-Lac is an insulator with a dielectric test record of 1200 volts more than shellac—and reduced it is a shellac. The recommended 8# cut at \$2.50 per gal.—in more than 5-gal. lots at \$2.25 per gal.

THE DON-O-LAC CO., INC.
ROCHESTER, N. Y.

DON-O-LAC
Insulator





The fact that the Quality of
B-V Punches
 (the punches with the Tool Steel Dies)
 has made them standard for
 the last 20 years should be
 the deciding factor on your
 selection.

Bonney-Vehlage Tool Co.
 61 N. J. R. Ave.
 Newark, N. J.

No. 4⁺

No. 50

No. 3

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CONDUCTOR
1917
AMERICAN RY. S. CO.

Your Conductors Are Your Salesmen

Improve their appearance and better their service
 with American Brand Punches, Buttons and Badges.

Fifty years of experience in the railway field has
 enabled us to produce products whose quality is
 unsurpassed.

Write for prices

AMERICAN RAILWAY SUPPLY CO.
 134-136 CHARLES STREET, NEW YORK



Type R-5. Double Register

Accurate Registration

The accurate, dependable registration secured by
 the use of International Registers assures a com-
 plete check on fares, and provides a basis of
 knowledge in the accounting after collection.

International Registers are made in single and
 double types for a wide variety of uses. Send for
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*Manufacturers of Single and Double fare
 registers, counters, car fittings. Exclusive sell-
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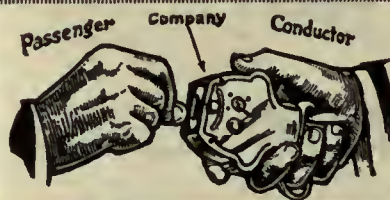
The International Register Co.
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Let us tell you of our especially designed fare box
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ONE MAN CAR

The Cleveland Fare Box Company
 CLEVELAND, OHIO

Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario



**Direct
 Automatic
 Registration**
 By the
Passengers
**Rooke Automatic
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Use them in your terminals—
PEREY TURNSTILES
 or **PASSIMETERS**

Faster than the ticket seller

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Compare Them

The faint light of a candle and the strong rays
 of a searchlight. They represent the compara-
 tive efficiency of other ways of finding what
 you want and advertising for it in the

SEARCHLIGHT SECTION
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Brake Shoes

A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type



Standard

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for

SAFETY
CAR

D-67 for Narrow Treads
D-87 for Wide Treads



American Brake Shoe and Foundry Co.

30 Church Street, New York

332 So. Michigan Ave., Chicago Chattanooga, Tenn.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



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KALAMAZOO, MICH., U. S. A.

PROVIDENCE

H-B

FENDERS

LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.

Wendell & MacDuffie Co., 61 Broadway, New York

General Sales Agents

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high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.

Alliance, Ohio



Dollars and Service

To keep your cars out of the repair shop means dollars to you and service—real service, to your patrons.

Dahlstrom cold-drawn steel shapes cannot warp, swell or crack. There is no danger of "car shop delays" from this cause. Such delays cost many dollars and many hard words.

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New York Office Philadelphia Office Chicago Office
832 Cunard Bldg. 9th and Sansom Streets 19 S. La Salle St.

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National Railway Appliance Co.

50 East 42nd St., New York City

Hegeman-Castle Corporation National Railway Appliance Co.
343 So. Dearborn St., Chicago, Ill. Munsey Bldg., Washington, D. C.
National Railway Appliance Co.
Little Bldg., Boston, Mass.

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Tool Steel Gears and Pinions
Anderson Slack Adjusters
Genesco Paint Oils
Dunham Hopper Door Device
Feasible Drop Brake Staffs
Flaxilnum Insulation
Anglo-American Varnishes,
Palate, Enamels, Surfacers,
Shop Cleaner
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way Specialties
Perry Slide Bearings
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Economy Power Saving Meter
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Garland Ventilators
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Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

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Carlisle, Pa.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.



**Continuous
service over
long periods
counts most**

Simplicity of design enables us to produce the lightest Trolley Catchers and Retrievers with the fewest and most rugged parts.

C. I. EARLL, York, Pa.

HASKELITE

The Plywood made with waterproof glue

An Engineering Material
used by car builders

Roofs for Side Panels
Headlining Ceilings
Bottoms and Backs of Seats

Write for Samples and Prices

HASKELITE MANUFACTURING CORP.
133 W. Washington St., Chicago, Illinois



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"TIGER-BRONZE"
AXLE
AND ARMATURE
BEARINGS**

*Not always the cheapest, but ever
lowest in ultimate cost*

MORE-JONES BRASS & METAL CO.
St. Louis, Missouri

Knutson Trolley Retrievers

For High-Speed Cars

The Trolley Supply Company, Massillon, Ohio

J. H. WILLIAMS & CO.

"THE WRENCH PEOPLE"

Brooklyn · Buffalo · Chicago

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Mercer and Colgate Streets, Jersey City, N. J.


Hand Brakes—Air Purifiers for Compressors—
Lighting Fixtures—Electric Vibrating Bells—
Thermostats—Switches, Receptacles and Plugs
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MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
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PITTSBURGH, PA.
Manufacturers of
**COIL AND ELIPTIC
SPRINGS**
FOR
RAILWAY SERVICE



POSITIONS VACANT

METABLE maker, able, ambitious, experienced; state qualifications, experience and salary expected. Chicago Surface Lines, 604 Borland Bldg., Chicago.

POSITIONS WANTED

AR builder, 14 years' experience as foreman in car construction and repairing. Can handle men and install efficiency methods for obtaining maximum production at minimum cost. PW-908, Elec. Ry. Journal, Old Colony Bldg., Chicago.

NGINEER, executive, electric railway and public service, construction, operation, maintenance; available immediately. Carl H. Fuller, 305 Elm Street, Youngstown, Ohio.

RADUATE electrical engineer, age 37, having been in charge of the transmission and distribution systems of a large Eastern railway now open for a position in above mentioned line or as manufacturer's salesman. PW-909, Elec. Ry. Journal, Real Estate Trust Bldg., Phila.

TUATION wanted as manager of railway or gas properties, preferably in the South. Have managed one of the largest combined street railway, gas and electric properties in the South for the past three years. Can furnish best references. PW-900, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

UPERINTENDENT, 17 years' experience in all phases of transportation, traffic and equipment in northern Ohio; very satisfactory relations with present employers; personal reasons for considering change of location; age 37, married; excellent references as to character and ability. PW-901, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

UPERINTENDENT of transportation with nearly 18 years' experience on large city, suburban and interurban properties desires making a change in near future; successful in dealing with public and employees. I would prefer a property that requires hard work, effort and ability to bring about results. Best of references as to character and ability. PW-904, Elec. Ry. Journal, Old Colony Bldg., Chicago.

TECHNICAL man, age 35, with 14 years' practical experience, now employed as superintendent of transportation Middle West desires position in transportation, mechanical or electrical department of an Eastern property; good references. PW-907, Elec. Ry. Journal, Old Colony Bldg., Chicago.

YOUNG man desires position as time table clerk or chief clerk; six years' experience. PW-903, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

SALESMEN WANTED

Salesman

falling on the railroad and traction lines to present a staple article of general use. state territory. AS-905, Elec. Ry. Journal.

SALESMAN AVAILABLE

SALESMAN with past experience in electric traction field, formerly master mechanic of equipment, desires change in line to represent firm calling on traction and mining trade; married man, but will accept any territory that is permanent. AS-906, Elec. Ry. Journal, Old Colony Bldg., Chicago.

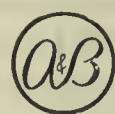
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"SEARCHLIGHT"
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Turbo Units, Rotary Converters, Transformers,
Motor Generator Sets, Dynamos and Motors

ARCHER & BALDWIN, Inc.

114-118 Liberty St., New York City

Telephone 4337-8 Rector

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8 ONE-MAN STREET CARS

These are single truck cars—31 feet long—complete with motors for 650 V. operation. Hand brakes and manually operated doors. Have just been released from service in a city of 38,000 population.

A BARGAIN

Waterloo, Cedar Falls & Northern
Railway
Waterloo, Iowa.

FOR SALE

200—G-E-67 and 50.....Motors
20—G-E-73..... (75 hp.) Motors
22—G-E-203P..... (40 hp.) Motors
4—G-E-205..... (100 hp.) Motors
16—G-E-210..... (65 hp.) Motors
4—G-E-219..... (50 hp.) Motors
22—West-101-B2... (40 hp.) Motors
2—West-506..... (25 hp.) Motors
4—West-548..... (75 hp.) Motors

TRANSIT EQUIPMENT CO.

501 Fifth Avenue, New York

You can get

A Production Checker at little cost

Here is an opportunity to get a *Productograph* to keep count and make curve chart record on one to twenty producing machines. From these records you know exactly the production you are actually getting from your machines. No guessing. It is in first class condition and various spare parts are included.

Bargain price for quick sale.

W. A. Hefner, care of McGraw-Hill Co.,
10th Ave. at 38th St., New York City

FOR SALE

500 tons 7 in. High 80 lb.

GIRDER RAILS

with Channel Plates—equal to new.
30 and 60 ft. lengths—will make low price.

Karasik, Friedman & Company, Inc.
Woolworth Bldg., New York

FOR SALE

TRANSFORMERS

1—Type H, Form RP, Cycles 60,
200 KVA., 19100/33000Y—
2300 Oil Cooled, Step Up
Transformer.

1—220 Volt (B) KW., 60 Cycle,
Oil Cooled, Step Up Trans-
former. 19100/33000Y —
2300.

4—Type HS, Form RT, Cycles
60, 135 KVA., 17100/19100/
33000Y — 370/370/185, Oil
Cooled Step Down Trans-
formers.

All filled with oil and in excellent
shape.

UNION TRACTION CO.

Nashville, Tennessee

For 20 Years

we have been
Buying and Selling

Second-Hand Cars

Trucks and Motors

At Your Service

ELECTRIC EQUIPMENT CO.

Commonwealth Bldg., Philadelphia, Pa

FOR SALE

15 International Fare Boxes

for registering dimes and nickels
with separate locked compartment
for pennies. Machines in perfect
condition.

Fairmount Park Transit Co.

Station W., West Park, Philadelphia, Pa.

700 tons new 9 in.

GIRDER RAIL

Penna. Steel Co. Section 228, 107 lb. to
the yard. Attractive price upon application.
Subject to R. W. Hunt & Company's In-
spection. Prompt shipment.

H. M. FOSTER COMPANY
Continental Building, Baltimore, Md.

ORDNANCE DEPARTMENT



UNITED STATES ARMY

*Philadelphia District Salvage Board
now represents all districts in the East*

Items of Compelling Interest From Bulletin No. 63—

(Write, wire or phone for complete bulletin)

Electric Line

Line installed between Morgan General Ordnance Depot and the California Loading Plant. This line will be sold in its present condition, present location, purchaser to remove all debris at his own expense. Wrecking operations to be started immediately after award is made. Prospective purchasers must satisfy themselves as to condition and quantity by inspection. Inspection of this line can be made upon application to the Commanding Officer, Morgan General Ordnance Depot, South Amboy, N. J.

31 poles, 12 in. base, 5 in. top, approximately 35 ft. long.

31 cross arms.

93 insulators with pins.

14,000 ft. (approx.) No. 8 bare copper wire.

SWITCHES

Twenty-six disconnecting switches, 300 ampere, 7500 volts, on slate panels. Sold in present condition, present location. Bids covering this equipment will be received and considered by the Chairman, Philadelphia District Salvage Board.

Location of material: Morgan General Ordnance Depot, South Amboy, N. J.

CONDENSERS

Three jet condensers, size 24 in. (bulky) capable of handling 10,000 lb. of exhaust steam per hour and 1300 to 1500 gallons of water per hour at 70 degrees temperature. 22 in. vacuum. Sold in present condition, present location. Bids covering this equipment will be received and considered by the Chairman, Philadelphia District Salvage Board.

Location of material: Morgan General Ordnance Depot, South Amboy, N. J.

TRANSFORMERS

One Westinghouse Transformer No. 10, style No. 109746, 6-140 cycle. Sold in present location, present condition. Bids covering this transformer will be received and considered by the Chairman, Philadelphia District Salvage Board.

Location of material: Morgan General Ordnance Depot, South Amboy, N. J.

LEAD COVERED CABLE

2500 ft. 2,000,000 C.M. Lead Covered Cable. 1200 ft. 4/0 3-conductor Lead Covered Cable, 2400 volt.

To be sold as is, where is, equipment installed. Location of material: Midvale Gun Plant, Nicetown, Pa.

The above to be sold by negotiation through the Philadelphia District Salvage Board.

STEEL STACKS

5 steel stacks, 110 ft. long, 60 in. diam., $\frac{3}{8}$ in. plate, provided with full sets of guy hooks, turnbuckles, rain-shields, etc., complete with breeching hoods, No. 10 gauge plate, braced with supporting angles. Stacks to be sold in the present condition, present location, purchaser to dismantle and remove equipment and all debris at his expense. Bids covering one or more of these stacks should be forwarded to the Chairman, Philadelphia District Salvage Board.

Location of material—Morgan General Ordnance Depot, South Amboy, N. J.

All communications, requests for further information or bulletin No. 63 listing many additional items should be addressed to the undersigned.

PHILADELPHIA DISTRICT

ORDNANCE SALVAGE BOARD



1710 Market St., Philadelphia, Pa.
Phone Locust 5120

WAR DEPARTMENT

FOR SALE

Two Interurban Cars

in fine condition, one user very little as parlor car, two months in the year: Can put cross seats in this car. Cars have parlor, smoking and baggage compartment with toilet, hot water heat, GE-204 Motors, American Locomotive Trucks.

SOUTHERN NEW YORK POWER
& RAILWAY CORPORATION
Hartwick, N. Y.

Keep your Eye
on the
Searchlight
and your
Advertisements in it

0197

here's a buy!

This steel body and its equipment was purchased for electric switching locomotive but was never assembled. Will sell the entire equipment listed below for \$9,500.00 F.O.B. Tacoma, Washington, or singly as follows:

1—Steel Body, Complete.....	\$3500.00
1—4-Motor G. E. 55 Equipment with Type M Control, Complete, (Except Gears).....	6000.00
1—14 E.L. Double End Air Brake Equipment (Except 2-D 3 E G Compressors, 1-J8 Governor—2-20½ x 42 Reservoir	500.00
3—A E R A—Standard Type E. C. Axles with 6-37 in. Rolled Steel Wheels, 3½ in. Thread, 7⁄8 in. Flange.....	460.00
2—Extra 37 in. Wheels as above.....	100.00
3—60-Tooth Gears 6-15/16 in. bore, 5¾ in. face, 2½ pitch, mounted on above axles.....	120.00
2—Gears as above.....	80.00
3—Extra 17-Tooth Pinions, 5-3⁄8 in. face, 2½ pitch.....	40.00
Total	\$10,800.00

For information write G. O. Snider, Purchasing Agent,
Tacoma Railway & Power Co., Tacoma, Washington

S-W BRAKE SLACK ADJUSTERS

SLACK in the brakes shortens brake-shoe life. Brake shoes are costly and car-house labor even more so. Inspections and upkeep require too large a force on most railways. Safety and revenue mileage cannot be increased where brake shoes are improperly set with resulting slow rates of braking and poor stops. Railway executives must face these facts squarely.

Automatic devices are safe and economical. S-W brake slack adjusters are no exception. They take up the slack in such a manner that the brake shoe gets an evenly distributed wear at every

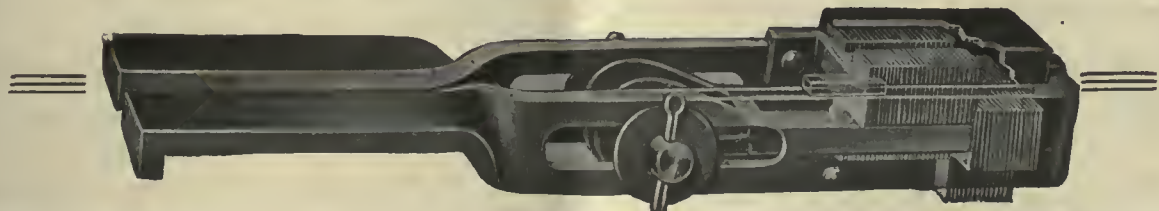
point of contact. The adjustment is automatic and inexpensive, and lasts throughout the life of the brake shoe.

S-W brake slack adjusters eliminate the old-time night inspections, waste of air because shoes are always at the correct distance from the wheel, and unnecessary strains on the brake rigging.

S-W brake slack adjusters are a big step toward maximum revenue cars because increased schedule speeds are obtained by making safer the use of high rates of braking with smooth stops.

You need to economize—let us show you how.

SMITH-WARD BRAKE COMPANY
233 37th Street, BROOKLYN, N. Y.



WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with
Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.
Western Elec. Co.

Anchor, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Midvale Steel & Ordnance Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
More-Jones Brass & Metal Co.

Babbitt Devices
Columbia M. W. & M. I. Co.
Western Elec. Co.

Badges and Buttons
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co., The
Western Elec. Co.

Batteries, Dry
National Carbon Co. Inc.
Western Elec. Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
Post & Co., Inc., E. L.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.
Western Elec. Co.

Benders, Rail
Niles-Bement-Pond Co.

Bollers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & Mfg. Co.

Book Publishers
McGraw-Hill Book Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Bores—Junction and Outlet
National Metal Molding Co.

**Brackets and Cross Arms (See also
Poles, Ties, Posts, Etc.)**
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Western Elec. Co.

Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Smith-Ward Brake Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

**Brakes, Brake Systems and Brake
Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.
Western Elec. Co.

Brooms, Track, Steel or Rattan
American Rattan & Reed Mfg. Co.
Western Elec. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
National Carbon Co. Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
National Carbon Co., Inc.
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

**Bushings, Case Hardened and
Manganese**
Bemis Car Truck Co.
Brill Co., J. G.
National Metal Molding Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Cambrie, Yellow & Black Varnished
American Di-Electric, Ltd.
Irvington Varnish & Insulator Co.

**Cambrie Tapes, Yellow & Black
Varnished**
American Di-Electric, Ltd.
Irvington Varnish & Insulator Co.

**Carbon Brushes. (See Brushes,
Carbon)**

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

**Cars, Passenger, Freight, Express,
etc.**

American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Midvale Steel & Ordnance Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
General Electric Co.

**Castings, Brass, Composition or
Copper**
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Earl, Chas. I.
Electric Service Supplies Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.

Celling, Car
Fantasote Co.

Checks, Employees
American Railway Supply Co.

Circuit Breakers
Automatic Reclosing Circuit
Breaker Co.
Cutter Elec. Mfg. Co.

Don-O-Lac Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

**Clamps and Connectors for Wires
and Cables**
Anderson Mfg. Co., A. & J. M.
Dassert & Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

**Cleaners and Scrapers—Track (S
also Snow-Plows, Sweepers and
Brooms)**
Brill Co., The J. G.

Cleats
National Metal Molding Co.
Western Elec. Co.

Clusters and Sockets
General Electric Co.

**Coal and Ash Handling. (See Con-
veying and Hoisting Machinery)**

Coil Bauding and Winding Machines
Comstock Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Don-O-Lac Co.
Eureka Co.
General Electric Co.
Mica Insulator Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Chicago Pneumatic Tool Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Concrete Products
Massey Concrete Products Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Condenser Papers
Irvington Varnish & Insulator Co.

Condolite, Flexible
Tubular Woven Fabric Co.

Conduits, Interior
National Metal Molding Co.
Western Elec. Co.

Connectors, Solderless
Dassert & Co.
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Russell Mfr. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
Don-O-Lac Co.
Eureka Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.

Cooling Systems
Spray Engineering Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebbing's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.
Trolley Supply Co.

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Crunes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Cresole
Barrett Co., The

Cresoting
Barrett Co., The

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

**Crossing Signals. (See Signals,
Crossing)**

Crossings, Frog & Switch
Wharton, Jr. & Co., Wm.

Crossings, Manganese
Indianapolis Switch & Frog Co.

**Crossings, Track. (See Track,
Special Work)**

Culvert Pipe, Concrete
Massey Concrete Products Co.

Culverts
Canton Culvert & Silo Co.

**Curtain Materials—(Vestibule) De
Pont Fabrikoid**
Du Pont de Nemours & Co., Inc.
E. I.

**Curtain Materials (Window) De
Pont Fabrikoid**
Du Pont de Nemours & Co., Inc.
E. I.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co.
Fantasote Co.
St. Louis Car Co.

Dealer's Machinery
Archer & Baldwin
Cleveland Armature Works
Electric Equipment Co.
Foster Co., H. M.
Hyman Michaels Co.

**Derailing Devices. (See also Track
Work)**
Cleveland Frog & Crossing Co.
Wharton, Jr. & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Bogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.

Doors and Door Fixtures
Brill Co., The J. G.
Dahlstrom Metallic Door Co.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

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Ingersoll-Rand Co.

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Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc.
Walter A.

Electrical Wires and Cables
American Electrical Works
Roebbing's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.

Arnold Co., The
Beeler, John A.
Byllesby & Co., H. M.
Clark Management Corp., E. W.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Gould, L. E.
Hemphill & Wells
Holst, Engelhardt W.
Horton Barker & Wheeler
Jackson, Walter
Jacobs & Co., J. L.
Kelly, Cooke & Co.
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Smith & Co., C. E.
Stone & Webster
White Engineering Corp., The J. G.
Wolff, Mark

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Fare Boxes
Cleveland Fare Box Co.
Economy Electric Devices Co.
Johnson Fare Box Co.
Ohmer Fare Register Co.
National Railway Appliance Co.

Feed Water Heaters
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.
Western Elec. Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works

Fibre and Fibre Tubing
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.

Field Coils (See Coils).

Filters, Water
Scaife & Sons Co., Wm. B.

Fluximum Insulation
National Railway Appliance Co.

Floodlights
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.
Western Elec. Co.

Floor Plates
American Abrasive Metals Co.

Forgings
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Funnel Castings
Wharton, Jr., Inc., & Co., Wm.

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.

Gaskets
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.

Electric Service Supplies Co.
Thayer & Co.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Gong (See Bells and Gongs)

Graphite
Morganite Brush Co., Inc.

Greases. (See Lubricants)

Grinders and Grinding Supplies
Metal & Thermit Corp.
Railway Track-work Co.
Western Elec. Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Hacksaws
Stadium Co., Inc.

Harp, Trolley
Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works
Western Elec. Co.

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.

Headlining
Haskelite Mfg. Co.
Pantasote Co.

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Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Steam)
Electric Service Supplies Co.
Smith Heater Co., Peter

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Chicago Pneumatic Tool Co.
Columbia M. W. & M. I. Co.
Ford Chain Block Co.
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The

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Ingersoll-Rand Co.

Hose, Bridge
Ohio Brass Co.

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Niles-Bement-Pond Co.

Hydrogrounds
Horne Mfg. Co.

Injectors
Schutte & Koerting Co.

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General Electric Co.
Thompson-Levering Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Insulating Cloth, Paper and Tape
American Di-Electric, Ltd.
General Electric Co.
Mica Insulator Co.
Okonite Co.
Sherwin-Williams Co.
Westinghouse Elec. & Mfg. Co.

Insulating Varnishes
American Di-Electric, Ltd.
Irvington Varnish & Insulating Co.

Insulation. (See also Paints)
American Di-Electric, Ltd.
Anderson M. Co., A. & J. M.

Dolph Co., J. C.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Okonite Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Slot
Irvington Varnish & Insulator Co.

Insulators. (See also Line Material)

Anderson M. Co., A. & J. M.
Don-O-Lac Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hemmings Glasco Co.
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

Jacks. (See also Cranes, Hoists and Lifts)
Buckeye Jack Mfg. Co.

Joints, Rail
Rail Joint Co.
Zelnicker Supply Company, Inc.
Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
Railway Roller Bearing Co.

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Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
National Electric Specialty Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent. (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
National Electric Specialty Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
McCable Lathe & Machinery Corp., J. J.
Niles-Bement-Pond Co.
Western Elec. Co.

Leather & Leather Substitutes (Leather Substitutes) Du Pont
Fabrikoid
Du Pont de Nemours & Co., Inc., E. I.

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Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)

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Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Dossert & Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

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Portable Machinery Co.

Locking Spring Boxes
Wharton, Jr., & Co., Wm.

Locomotives, Electric
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & Mfg. Co.

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Galena-Signal Oil Co.
Texas Co.
Universal Lubricating Co.

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Galena-Signal Oil Co.
Texas Co.
Universal Lubricating Co.

Machine Tools
Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.

Machine Work
Columbia M. W. & M. I. Co.

Machinery, Insulating
American Insulating Machine Co.

Magnet Wire
Belden Mfg. Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Meters (See Instruments)
Electric Service Supplies Co.

Meters, Car, Watt-Hour
Economy Electric Devices Co.

Mica
Mica Insulator Co.

Molded Insulations & Parts
Belden Mfg. Co.

Molding, Metal
Allis-Chalmers Mfg. Co.
Dahlstrom Metallic Door Co.
National Metal Molding Co.

Motor Leads
Dossert & Co.

Motormen's Seats
Allis-Chalmers Mfg. Co.
Brill Co., J. G.
Electric Service Supplies Co.
Wood Co., Chas. N.

Motors, Electric
Westinghouse Elec. & Mfg. Co.

Motors and Generators, Sets
General Electric Co.
Western Elec. Co.

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Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

Oil Burning Equipment
Schutte & Koerting Co.

Oils. (See Lubricants)

Oxy-Acetylene (See Cutting Apparatus Oxy.)

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Post & Co., Inc., E. L.
Westinghouse Elec. & Mfg. Co.

Paints & Varnishes (Preservatives)
Sherwin-Williams Co.

Paints and Varnishes (Insulating)
American Di-Electric, Ltd.
Dolph Co., John C.
Mica Insulator Co.
Sherwin-Williams Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.
Sherwin-Williams Co.

Paving Bricks, Filler and Stretcher
Nelsonville Brick Co.

Paving Material
American Brake Shoe & Fdry. Co.
Barrett Co., The
Nelsonville Brick Co.

Paving Pitch
Barrett Co., The

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Rollers
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Pipe
National Tube Co.

Pipe Fittings
Power Specialty Co.
Standard Steel Works Co.
Westinghouse Traction Brake Co.

Planers. (See Machine Tools)

Pilers, Insulated
Electric Service Supplies Co.

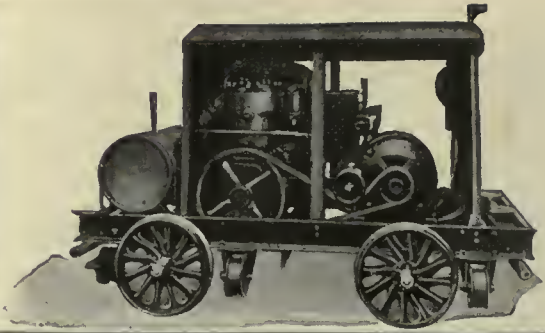
Plugs
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Pneumatic Tools
Ingersoll-Rand Co.

Poles, Metal Street
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Hubbard & Co.

Poles, Posts, Piling and Lumber
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Duncan Lumber Co.
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Southern Cypress Mfrs. Assn.
Western Elec. Co.

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National Tube Co.
Nuttall Co., R. D.

Poles, Tubular Steel

Electric Railway Equipment Co.
National Tube Co.

Pothead

Okonite Co.

Power Saving Devices

Economy Electric Devices Co.
National Ry. Appliance Co.

Preservatives

Barrett Co., The

Pressure Regulators

General Electric Co.
Westinghouse Elec. & Mfg. Co.

Pumps

Allis-Chalmers Mfg. Co.
Schutte & Koerting Co.

Punches, Ticket

American Railway Supply Co.
Bonney-Vehslage Tool Co.
International Register Co., The
Wood Co., Chas. N.

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Scaife & Sons Co., Wm. B.

Rail Grinders. (See Grinders)**Rail Welding**

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Westinghouse Elec. & Mfg. Co.

Rattan

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Electric Service Supplies Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

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Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Rooke Automatic Register Co.

Reinforcement, Concrete

American Steel & Wire Co.

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Coil Bending and Winding Machines)
Columbia M. W. & M. I. Co.
Comstock Mfg. Co.
Electric Service Supplies Co.

Repair Work. (See also Coils)

Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Replacers, Car

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Resistance, Grid

Columbia M. W. & M. I. Co.

Resistance, Wire and Tube

General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Retrievers, Trolley. (See Catchers

and Retrievers, Trolley)

Rheostats

General Electric Co.
Mica Insulator Co.
Westinghouse Elec. & Mfg. Co.

Roof Building

Barrett Co., The

Roofing, Car

Pantasote Co.

Roofs

Haskelite Mfg. Co.

Rosettes

National Metal Molding Co.

Rubber Covered (Wires and Cables)

Belden Mfg. Co.

Sand Boxes

Horne Mfg. Co.

Sanders, Track

Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car

Brill Co., The J. G.

Scrapers, Track. (See Cleaners and

Scrapers, Track)

Sents, Car. (See also Rattan)

American Rattan & Reed Mfg. Co.
Brill Co., The J. G.
St. Louis Car Co.

Sealing Materials

Brill Co., J. G.
Pantasote Co.

Second-Hand Equipment

Archer & Baldwin
Cleveland Armatures Works
Foster Co., H. M.
Hyman Michaels Co.
Zelnicker Supply Co., Inc.
Walter A.

Shades, Vestibule

Brill Co., The J. G.

Shapes—Cold Drawn

Dahlstrom Metallic Door Co.

Shovels

Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
Hubbard & Co.

Signals, Car Starting

Consolidated Car Heating Co.
Electric Service Supplies Co.
National Pneumatic Co., Inc.
Western Elec. Co.

Signal Systems, Block

Electric Service Supplies Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing

Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Shock Adjusters. (See Brake Ad-

justers)

Sheet Wheels and Cutters

Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co.
Electric Railway Equipment Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

Snow-Plows, Sweepers and Brooms

American Rattan & Reed Mfg. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.

Sockets and Receptacles

National Metal Molding Co.

Soldering and Brazing Apparatus.

(See Welding Processes and Apparatus)

Solderless Connectors

Frankel Connector Co.

Special Adhesive Papers

Irrington Varnish & Insulator Co.

Spikes

American Steel & Wire Co.

Splicing Compounds

Westinghouse Elec. & Mfg. Co.

Splicing Sleeves. (See Clamps and

Connectors)

Spray Nozzles

Schutte & Koerting Co.

Springs, Car and Truck

American Steel Foundries
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.

Sprinklers, Track and Road

Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Steel Castings

Wharton, Jr., & Co., Wm.

Steps, Car

American Abrasive Metals Co.
American Mason Safety Tread Co.

Stokers, Mechanical

Babcock & Wilcox Co.
Westinghouse Elec. & Mfg. Co.

Storage Batteries. (See Batteries,

Storage)

Strand

Copper Clad Steel Co.
Cutter Elec. & Mfg. Co.
Roebbing's Sons Co., J. A.

Superheaters

Babcock & Wilcox Co.
Power Specialty Co.

Sweepers, Snow. (See Snow Plows,

Sweepers and Brooms)

Switchboards

Condit Electrical Mfg. Co.

Switch Stands

Ramapo Iron Works

Switches, Track. (See Track

Special Work)

Switchboxes

Western Elec. Co.

Switches and Switchboards

Allis-Chalmers Mfg. Co.
Anderson Mfg. Co., A. & J. M.
Cutter Co.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Tampers, Tie

Ingersoll-Rand Co.

Tapes and Cloths. (See Insulating

Cloth, Paper and Tape)

Telephones and Parts

Electric Service Supplies Co.

Testing Instruments. (See Instru-

ments, Electrical Measuring,

Testing, etc.)

Thermostats

Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers

Electric Service Supplies Co.

Ties and Tie Rods, Steel

Barbour-Stockwell Co.

International Steel Tie Co.

Ties, Wood Cross. (See Poles, Ties,

Posts, etc.)

Tongue Switches

Wharton, Jr., & Co., Wm.

Tool Holders

Williams & Co., J. H.

Tools, Thread Cutting

Williams & Co., J. H.

Tools, Track & Miscellaneous

American Steel & Wire Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Hubbard & Co.
Railway Track-work Co.

Torches Acetylene (See Cutting

Apparatus)

Tower Wagons and Auto Trucks

McCardell & Co., J. R.

Towers and Transmission Structures

Archbold-Brady Co.
Bates Expanded Steel Truss Co.
Westinghouse Elec. & Mfg. Co.

Track Expansion Joints

Wharton, Jr., & Co., Wm.

Track, Special Work

Barbour-Stockwell Co.
Columbia M. W. & M. I. Co.
New York Switch & Crossing Co.
Ramapo Iron Works

St. Louis Frog & Switch Co.

Wharton, Jr., & Co., Inc., Wm.

Transfer Tables

Archbold-Brady Co.

Transfers. (See Tickets)**Transformers**

Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Treads, Safety, Stair, Car Step

American Abrasive Metals Co.
American Mason Safety Tread Co.

Trolley Bases

Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.
Nuttall Co., R. D.
Ohio Brass Co.
Trolley Supply Co.

Trolley Bases, Retrieving

Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.

Nuttall Co., R. D.

Ohio Brass Co.

Trolley Material

Ohio Brass Co.

Tralleys and Trolley Systems

Ford Chain Block Co.

Tralley Wheels. (See Wheels,

Tralley)

Trolley Wire

American Electrical Works
American Steel & Wire Co.
Anaconda Copper Mining Co.
Copper Clad Steel Co.
Roebbing's Sons Co., John A.

Trucks, Car

Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Tubing, Steel

Dahlstrom Metallic Door Co.
National Tube Co.

Tubing, Yellow and Black Flexible

Varnished
Irrington Varnish & Insulator Co.

Turbines, Steam

Allis-Chalmers Mfg. Co.
General Electric Co.
Terry Steam Turbine Co.
Western Elec. Co.
Westinghouse Elec. & Mfg. Co.

Turnstiles

Perly Mfg. Co., Inc.

Upholstery Materials

American Rattan & Reed Mfg. Co.

Upholstery Materials (Car Seats)

Du Pont Fabrikoid
Du Pont de Nemours & Co., Inc.
E. I.

Valves

Ohio Brass Co.
Schutte & Koerting Co.
Westinghouse Traction Brake Co.

Varnished Papers

Irrington Varnish & Insulator Co.

Varnished Silks

Irrington Varnish & Insulator Co.

Ventilators, Car

Brill Co., The J. G.
National Railway Appliance Co.
Railway Utility Co.

Wires, Pipe

Williams & Co., J. H.

Water Softening & Purifying

Systems
Scaife & Sons Co., Wm. B.

Welded Rail Joints

Indianapolis Switch & Frog Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Welders, Portable Electric

Electric Railway Improvement Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Welding Processes and Apparatus

Electric Railway Improvement Co.
General Electric Co.
Ohio Brass Co.
Metal & Thermit Corp.
Rail Welding & Bonding Co.
Westinghouse Elec. & Mfg. Co.

Wheels, Car, Steel and Steel Tired

American Steel Foundries

Wheel Guards. (See Fenders and

Wheel Guards)

Wheel Presses. (See Machine Tools)**Wheels, Car, Cast Iron**

Bemis Car Truck Co.
Carnegie Steel Co.
Griffin Wheel Co.
Standard Steel Works Co.

Wheels, Trolley

Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
Flood City Mfg. Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

Whistles, Air

General Electric Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Wire Rope

American Steel & Wire Co.
Roebbing's Sons Co., John A.

Wires & Cables

American Elec'l Works
American Steel & Wire Co.
Anaconda Copper Mining Co.
Belden Mfg. Co.
Copper Clad Steel Co.
General Electric Co.
Okonite Co.
Roebbing's Sons Co., John A.
Westinghouse Elec. & Mfg. Co.

Wire Rope

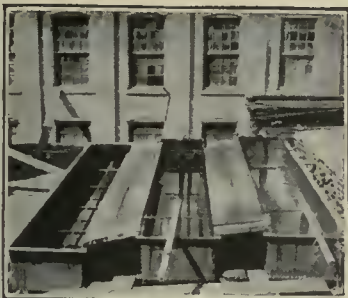
Copper Clad Steel Co.

Wood Preservatives

Barrett Co., The

Wrenches

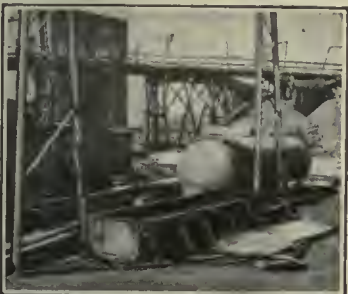
Williams & Co., J. H.



Paper Mill's permanent equipment for hot and cold treatment—three steel tanks for hot bath, cold bath and for drippings.



Industrial Plant's equipment for hot and cold treatment—two wooden tanks, lined with galvanized sheet iron, equipped with steam coils for heating preservative. Draining board at left.



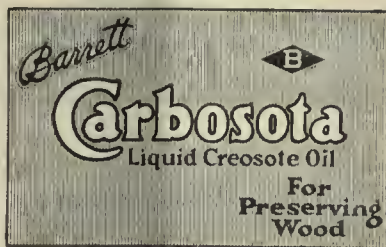
Plant of iron bins for hot and cold treatment, with 10,000 gallon storage tank for preservative. Yard crane used for handling timber.



Single unit tank for dipping lumber of small cross-section, and species readily impregnated in heated Carbosota. Capacity: 400 pieces of 1 in. by 4 in. by 5 ft. per charge.



Single unit plant for hot and cooling treatment. Wood tank, lined with sheet metal, equipped with steam coils. Capacity: 10,000 ft. B. M., per 24 hour day.



Carbosota has Popularized Wood Preservation—

CARBOSOTA Liquid Creosote Oil has made possible the more general practice of wood preservation.

Thousands of timber users the country over are increasing the life of structural wood—practicing timber conservation—through Open Tank treatment with Carbosota.

As will be seen by the illustrations, costly apparatus is not required. A non-pressure carbosoting plant, capable of treating small or large quantities of lumber, posts and timber, can be readily installed at reasonable cost.

Carbosota Liquid Creosote Oil is a highly refined and specially processed coal-tar creosote, particularly adapted for Surface treatments (brush treatment or painting, spraying and dipping), and the Open Tank process (hot and cold or hot and cooling, treatment). It conforms to standard specifications. Its superior feature is the low liquid point of 41° F.

Non-pressure treatments, either the Open Tank process or Surface treatments are available to every consumer. Literature free upon request.

(Green wood cannot be effectively creosoted by non-pressure processes. It should be seasoned. All framing, drilling of bolt holes, etc., should be completed before treatment. If this is impossible, two brush coats of Carbosota should be applied to all untreated surfaces exposed by subsequent cutting or drilling.)

The Barrett Company

New York	Chicago	Philadelphia	Boston	St. Louis
Cleveland	Cincinnati	Pittsburgh	Detroit	New Orleans
Birmingham	Kansas City	Minneapolis	Dallas	
Nashville	Syracuse	Seattle	Peoria	Atlanta
Salt Lake City	Bangor	Washington	Johnstown	Duluth
Youngstown	Milwaukee	Toledo	Columbus	Lebanon
Lafayette	Bethlehem	Elizabeth	Buffalo	Richmond
Omaha	Houston	Denver	Baltimore	Jacksonville

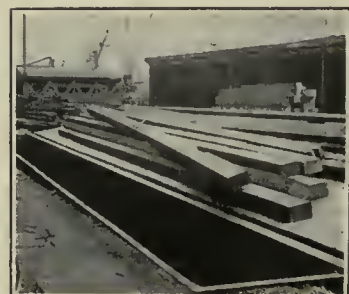
THE BARRETT COMPANY, LIMITED:
 Montreal Toronto Winnipeg
 Vancouver St. John, N. B. Halifax, N. S.



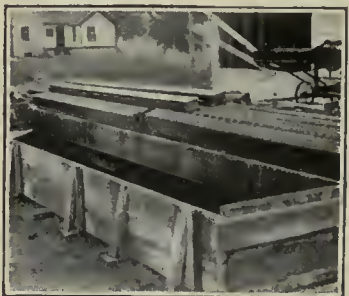
Butt-treating cedar fence posts by hot and cooling treatment. Typical form equipment—110 gallon drum with fire place underneath.



Small, single unit, hot and cooling wood tank lined with galvanized sheet iron; steam coils and two ton chain block hoist. Used mostly for creosoting in industrial repair work.



Single unit steel tank for hot and cooling treatment of freight car sills. Capacity 20 to 24 sills per 24 hour day.



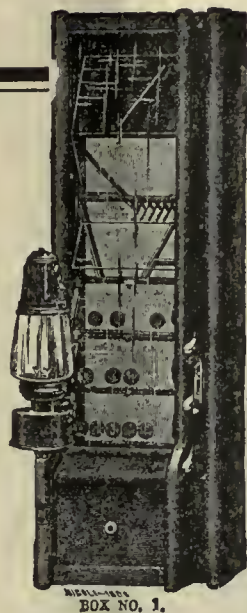
Farmer's home-made hot and cooling tank, wood, lined with sheet iron, without steam coils, as work of treating silo staves is done in summer.



Consumer's Open Tank process (hot and cooling treatment) cedar poles creosoting plant.



Single unit tank for creosoting cool mine shaft timber. Built of tongue and groove lumber, double wall, couled, etc. Metal lining is preferable to guard against leakage.



Thirty-two years ago—One of the exhibits in the 1889 Convention Issue

The Annual Exhibit of
*Electric Railway Equipment
Materials and Supplies*

has appeared every year for over
a generation in the advertising
section of the

ELECTRIC RAILWAY JOURNAL
ANNUAL CONVENTION
AND
CONVENTION REPORT
ISSUES

This year a special effort is being
made by the industry's most pro-
gressive manufacturers to exhibit
their latest products in the form
that will provide electric railway
executives with the maximum of
useful and interesting information.

The Annual Convention Issue will be dated
SEPTEMBER 24, 1921

You Can Figure This Shop as One of Your Assets



IT's just as ready to do your work as though it were your own, just as experienced in doing electric railway work, just as conscientious about doing it right.

The manner in which this business is organized and financed results in overhead charges less than those which have to be figured by most roads in their own shop costs.

Our huge stocks of raw materials purchased at near-bottom prices further keep costs down.

Our policy of depending on small profits and many orders makes the profit item negligible to any one customer.

As for quality of work — it has built our business

Let us compete on price, quality and delivery with your own shop or with



any other. Send your blueprints and specifications and see for yourself.

Columbia Machine Works & Malleable Iron Co.
Atlantic Ave. and Chestnut St.
Brooklyn, N. Y.

F. F. Bodler, San Francisco, Cal.
W. McK. White, 343 So. Dearborn St., Chicago, Ill.
J. L. Whitaker, 141 Milk St., Boston Mass.
Railway & Power Eng. Corp., 133 Eastern Ave., Toronto, Ont.
E. A. Thornwell, 1026 Atlanta Trust Bldg., Atlanta, Ga.

AIR BRAKE HANDLES: Bronze.....	.....
AIR BRAKE HANDLES: Malleable Iron.....	.....
CAR TRIMMINGS:	.....
Conductor Signal Belts.....	.....
Door Sheaves and Track.....	.....
Motorman's Seats.....	.....
Patent Door Locks.....	.....
Platform Foot Gongs.....	.....
Register Rod Fittings.....	.....
Stationary Register Pulleys.....	.....
Stationary Register Pulleys, Double.....	.....
Swinging Register Pulleys.....	.....
CASTINGS: Special Attention Given to All Classes...	.....
Aluminum.....	.....
Brass.....	.....
Bronze.....	.....
Cast Steel.....	.....
Grey Iron.....	.....
Malleable Iron.....	.....
White Metal.....	.....
Zinc.....	.....
CONNECTORS: Two-Way, Three-Way, Four-Way..	.....
CONTROLLER HANDLES:	.....
Bronze, operating.....	.....
Bronze, reversing.....	.....
Malleable Iron, operating.....	.....
Malleable Iron, operating, adj. type.....	.....
Malleable Iron, operating, with bronze or steel bushings.....	.....
Malleable Iron, reversing.....	.....
Malleable Iron, reversing, adj. type.....	.....
Malleable Iron, reversing, with bronze or steel bushings.....	.....
CONTROLLER PARTS:	.....
Contact Fingers, operating.....	.....
Contact Fingers, reversing.....	.....
Contact Segment Tips.....	.....
Contact Segments.....	.....
Contact Washers.....	.....
Controller Finger Tips.....	.....
Controller Cylinder Shafts.....	.....
W. H. type HL Controller Parts.....	.....
G. E. type M, MK and PC Controller Parts.....	.....
DESTINATION SIGNS, STEEL.....	.....
DROP FORGINGS: Light, Medium, Heavy.....	.....
DUST PROOF AND OIL LUBRICATED CENTER PLATES.....	.....
GRID RESISTANCE: Complete for two or four motor equipment.....	.....
Grid Resistance: Repair Parts for All Types.....	.....
LINE MATERIAL:	.....
Feeder Ears.....	.....
Splicing Ears.....	.....
Trolley Ears.....	.....
MACHINERY:	.....
Armature Bearing, Babbitting and Broaching.....	.....
Armature Machine, Columbia Pat'd.....	.....
Armature Buggies.....	.....
Armature Lead Flattening Rolls.....	.....
Armature Shaft Straightener.....	.....
Armature Winding Stands.....	.....
Axle Straightener.....	.....
Babbitting Moulds.....	.....
Banding and Heading Machines.....	.....
Bearing Boring Machines.....	.....
Car Holsts.....	.....
Car Replacers.....	.....
Coil Taping Machines.....	.....
Coil Winding Machines.....	.....
Pinion Pullers, any type.....	.....
Pinion Pullers: Repair Parts.....	.....
Pit Jack, Pneumatic.....	.....
Signal or Target Switches.....	.....
Tension Stands.....	.....
MOTOR SUSPENSION BARS.....	.....
MOTOR AND TRUCK SPRING CAP CASTINGS.....	.....
PLOW TERMINALS.....	.....
POWER STATION: Special attention given to the Manufacture of Standard Boiler and Stoker Grate Bars; also Ash and Coal Down Take Pipes; or other types of Castings used in Power Stations.....	.....
RAILWAY MOTOR PARTS:	.....
Armature Bearing Shells: Malleable Iron.....	.....
Armature Bearing Shells: Semi-Steel.....	.....
Armature Bearings: Bronze.....	.....
Axle Bearing Shells: Malleable Iron.....	.....
Axle Bearing Shells: Semi-Steel.....	.....
Axle Bearings: Bronze.....	.....
Axle and Armature Bearings: With or Without Babbitting Lining: Base, Lead or Tin.....	.....
Armature Coils.....	.....
Armature Shafts.....	.....
Bolts, Special for Motors and Tractors.....	.....
Brushholder Parts.....	.....
Brushholders, Complete.....	.....
Commutators, All Types.....	.....
Dowel Pins for Armature and Axle Bearings.....	.....
Field Coil Terminals.....	.....
Field Coils.....	.....
Gear Cases: Malleable Iron.....	.....
Gear Cases: Sheet Steel, Welded or Riveted.....	.....
Motor Covers.....	.....
Pinion Nuts.....	.....
Thrust Collars.....	.....
RATCHET BRAKE HANDLES: Bronze.....	.....
Ratchet Brake Handles: Malleable Iron.....	.....
THIRD RAIL SHOE BEAM: Repair Parts.....	.....
THIRD RAIL SHOE BEAMS.....	.....
TROLLEY CONTACT WASHERS.....	.....
TROLLEY HARPS.....	.....
TROLLEY POLES.....	.....
TROLLEY WHEELS, COLUMBIA.....	.....
Trolley Wheels to Specifications.....	.....
RUCK PARTS:	.....
Brake Pins.....	.....
Brake Rigging for All Types of Brakes.....	.....
BRACKES, for Maximum Traction Trucks, Columbia Pat'd.....	.....
Coupling Pins.....	.....
Equalizers.....	.....
Gusset Plates.....	.....
Journal Box Covers.....	.....
Journal Box Shims.....	.....
Journal Boxes.....	.....
Journal Brass Wedges.....	.....
Journal Brasses.....	.....
Journal Check Plates.....	.....
Turnbuckles.....	.....



It Signifies Just This—

Every Safety Car having this monogram on its service door is a "Birney" car—from our Philadelphia Plant, American Car Company, St. Louis, or Wason Manufacturing Company, Springfield.

That the American Car Company collaborated with Mr. Birney in developing this better service car, building the first order for Ft. Worth, Texas, and that it was the originator's ingenuity which has made it possible for street railways to operate more cars at less expense, provide better service and to increase earnings.



THE J. G. BRILL COMPANY
PHILADELPHIA, PA.



AMERICAN CAR CO. —
ST. LOUIS MO.

G. C. KUHLMAN CAR CO.
CLEVELAND, OHIO.

WASON MAN'G CO.
SPRINGFIELD, MASS.

"PROSPERITY,

like the tide, rises and ebbs," says a bank advertisement, "but the wealth that endures is the wealth that cannot be long depreciated by surface influences."

COLLIER SERVICE has been engaged for 30 years in securing an income to electric railway properties that remains unaffected by "surface" influences.

The prosperity of the business world has many times risen and ebbed—but no client of COLLIER SERVICE, be the property large or small, has suffered a reduction or interruption in the stipulated income from his car card space.

That is why so many executives have decided in favor of established COLLIER SERVICE.



Barron G. Collier

Candler Bldg., New York

ELECTRIC RAILWAY JOURNAL



ILLUSTRATING
the progressive steps by
which Collier Service has
developed and is main-
taining the standard of car
card advertising



Collier Service

Candler Bldg., New York

Systematic Replacement



While overhauling your rolling stock it is very important to determine whether the old motor equipments that are still in service have reached the limit of their economic life.



Where maintenance costs are kept the records will show at once which motors it will pay to rebuild and which motors should be replaced.



When cars are retained in service with old motor equipments that are beyond renewal, they become not only revenue consumers, but interfere with the regular operating schedules of cars having modern, efficient motor equipments, and thus cause dissatisfaction to the public in general.



Westinghouse No. 508, 25 hp., and No. 514, 40 hp., motors, now in successful operation throughout the country, have sufficient capacities to replace older motors of similar capacity and will show a handsome return on the investment.

Practical railway economy and the development of public good will justify the elimination of high maintenance and unreliable equipment.

*Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.*

Westinghouse

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL/Editors

HENRY H. NORRIS, Managing-Editor

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Advertising Index—Alphabetical, 50; Classified, 44, 46, 48; Searchlight Section, 42-43

Solving The Interurban Problem—



One of the Missouri & Kansas Railway Automatic Substations

The substation operator, on a basis of work done, is the highest paid man on the suburban railway. His salary, when taken together with equipment costs and upkeep, presents an international interurban railway problem.

An effective solution of this problem was recently obtained by Missouri & Kansas Railway men cooperating with Westinghouse engineers, and their foresight has shown the way for every interurban railway to *reduce operating expenses* and *increase efficiency*.

Two Westinghouse *automatic* substations on this line are now handling a daily load with exceptional ease and with absolutely no attention except an occasional inspection. Although extremely simple in design, these stations are highly efficient.

Let Us Solve Your Problem

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

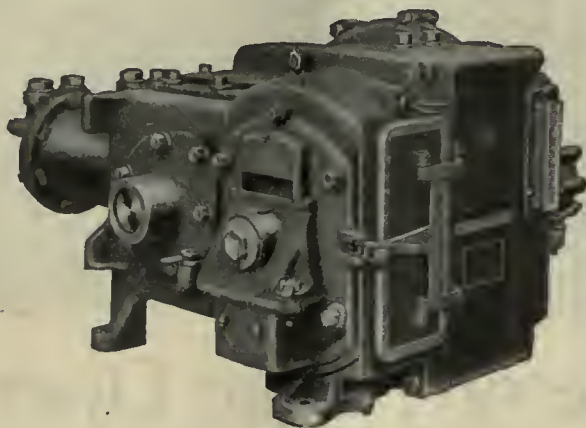
Offices in all Principal American Cities

Westinghouse

Automatic Substations

now available

A THOROUGHLY PRACTICAL HIGH CAPACITY CONTINUOUS-SERVICE COMPRESSOR



D3F

the height of development

THE D3F Type Westinghouse Compressor, with a displacement of 38 cu.ft. per minute and a capacity for *continuous operation* at 100 lbs. pressure without the possibility of a dangerous rise in temperature, is designed for heavy traction service on Elevated and Subway cars where an unusually large and continuous volume of compressed air is required.

The continuous operation feature represents a marked advance in the design of heavy traction compressors and has been accomplished by the use of a motor so

ventilated as to preclude prohibitively high temperatures. The compressor proper also embodies an improved system of positive lubrication which permits of more satisfactory operation than could otherwise be expected.

The machine is of simple, rugged construction, requiring only normal attention and insuring maximum service at a low maintenance cost.

The general design incorporates all the desirable features of the other well-known standard Westinghouse Compressors.

*The latest improved-type cars of the New York
Municipal Railway are equipped with the D3F.*

WESTINGHOUSE TRACTION BRAKE Co.

General Office and Works, Wilmerding, Pa.

ATLANTA
BOSTON
COLUMBUS, O.
HOUSTON, TEX.

CHICAGO
DENVER, COL.
MEXICO CITY
NEW YORK



PITTSBURGH
SAN FRANCISCO
ST. LOUIS, MO.
SEATTLE, WASH.

ST. PAUL, MINN.
LOS ANGELES
SALT LAKE CITY
WASHINGTON



Private or Public Operation the Safety Car Is the Choice for Both

The city of New York has gone and done it again!

What?

Purchased more genuine Safety Cars.

The first lot of twenty-eight made such a hit with the public that now another forty-five have been ordered, some to give additional safety service on the Staten Island Midland Lines and others to inaugurate safety service on Williamsburgh Bridge.

What's of further interest is that the City of Detroit has followed New York's example, the first of its twenty-five Safeties already arrived started off the operation of the Detroit Municipal Railway.

The examples of New York, Detroit, Seattle, Pekin, Ill.,

St. Petersburg, Fla., and other municipal lines will bear quoting if any official of your city administration wants to know the why and wherefore of the Safety Car.

You will be careful to impress him, of course, that these cars were selected because they are equipped with the famous Safety Devices Combination without which *no* car is a Safety Car.

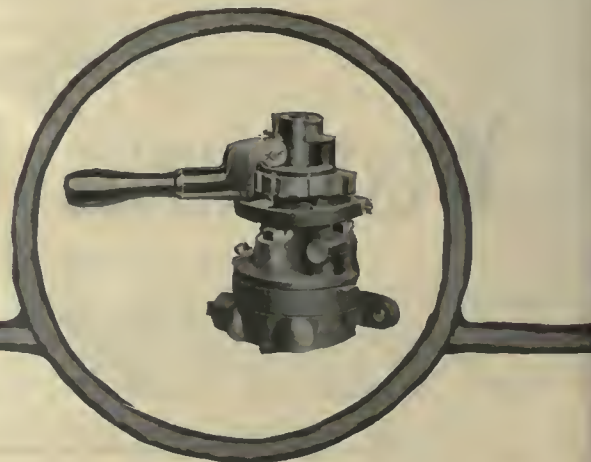
It Is a Genuine Safety Car Only When

it is equipped with automatic laborless apparatus, so interlocked that, regardless of the illness or distraction of the operator the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

Safety Car Devices Company

Boatmen's Bank Bldg., St. Louis

Chicago San Francisco New York Washington Pittsburgh



O-B Trolley Base



O-B Base—Form 1—Patented

Gives You the Pressure You Want On High Wire and Low

You know what pressure you need on the trolley wire. Set the O-B Trolley Base for it.

It will give you a practically uniform pressure from under the roof hook to an almost vertical pole position. Always you get enough to hold wheel to wire—never undue, destructive pressure.

Especially is this uniform pressure desirable in the horizontal pole position, as it keeps the pole from jumping free of the roof hook.

O-B Base has several other worth-while characteristics. It has strength to spare for hard service. It is easy to take care of because it is accessible and simple. All bearings have renewable bushings—for a little money an old O-B Base can be made new again.

*O-B Bases are absolutely interchangeable—
repair parts always fit.*



One man lifts the base off the stem and exposes all the vital parts.

Notice, particularly, the hook-down feature and the caged roller bearings.

The Ohio Brass Company, Mansfield, Ohio

Manufactures: Trolley Materials;
Rail Bonds; High Tension Porcelain
Insulators; Third Rail Insulators;
Electric Railway Car Equipment.



New York, Philadelphia, Pittsburgh,
Chicago, Los Angeles, San Francisco,
Paris, France



FORM 100
THE DENVER & INTERURBAN RAILROAD COMPANY
WILLIAM H. EDMUNDS, RECEIVER
DENVER, COLORADO

October 5th, 1920.

Bridgeport Brass Co.,
Bridgeport,
Connecticut.

Gentlemen:

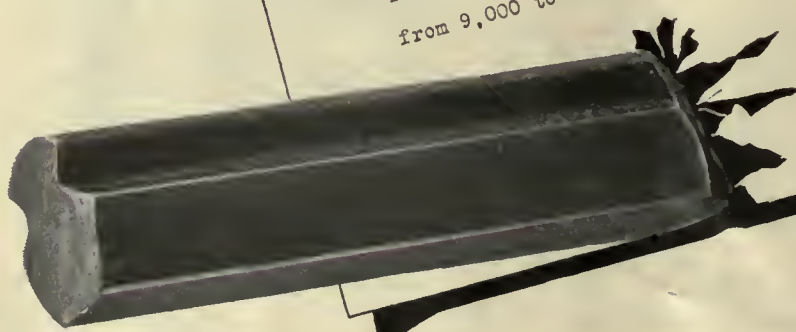
I wish to acknowledge your letter of September 30th extending invitation to visit your Space No. 637 at the Electric Railway Convention. Owing to some unforeseen complications, will be unable to attend this year, however, on account of your interest in the performance of your wire on our property I am attaching herewith small section of wire cut from one of the spans of our line at a place where a new section brake was installed. The wire at the place where this sample was removed has been in service eleven years, has had approximately 65,000 trains pass under it and is but nineteen feet above the track at this point instead of our standard twenty-two foot height, thereby receiving additional pressure from the collector shoes over that of the regular main line.

I might also add that after twelve years operation we still have our first break in the wire to occur and not a foot of Phono Electric has been replaced though operating from 9,000 to 12,000 trains annually.

Yours very truly,

W. H. Edmunds

Section of Phono-Electric Wire exemplifying the service of 11 years



Phono-Electric Trolley Wire Gives Satisfactory Service Everywhere

Bridgeport Brass Company
Bridgeport **Connecticut**

What 109 to 2851 means to you

The curve shown on this page indicates the average number of Steel Twin Ties to each order for the last ten years.

Its steep and rapid ascent from 109 ties in 1911 to 2,851 in the first half of 1921 is ample evidence of the wide spread approval by track engineers of Steel Twin Tie Track.

The dollars and cents reason is the strongest for the use of this type of track in paved streets. Its first and final cost is lower than conventional types with wood ties. It economizes in grading; in concrete; in labor.

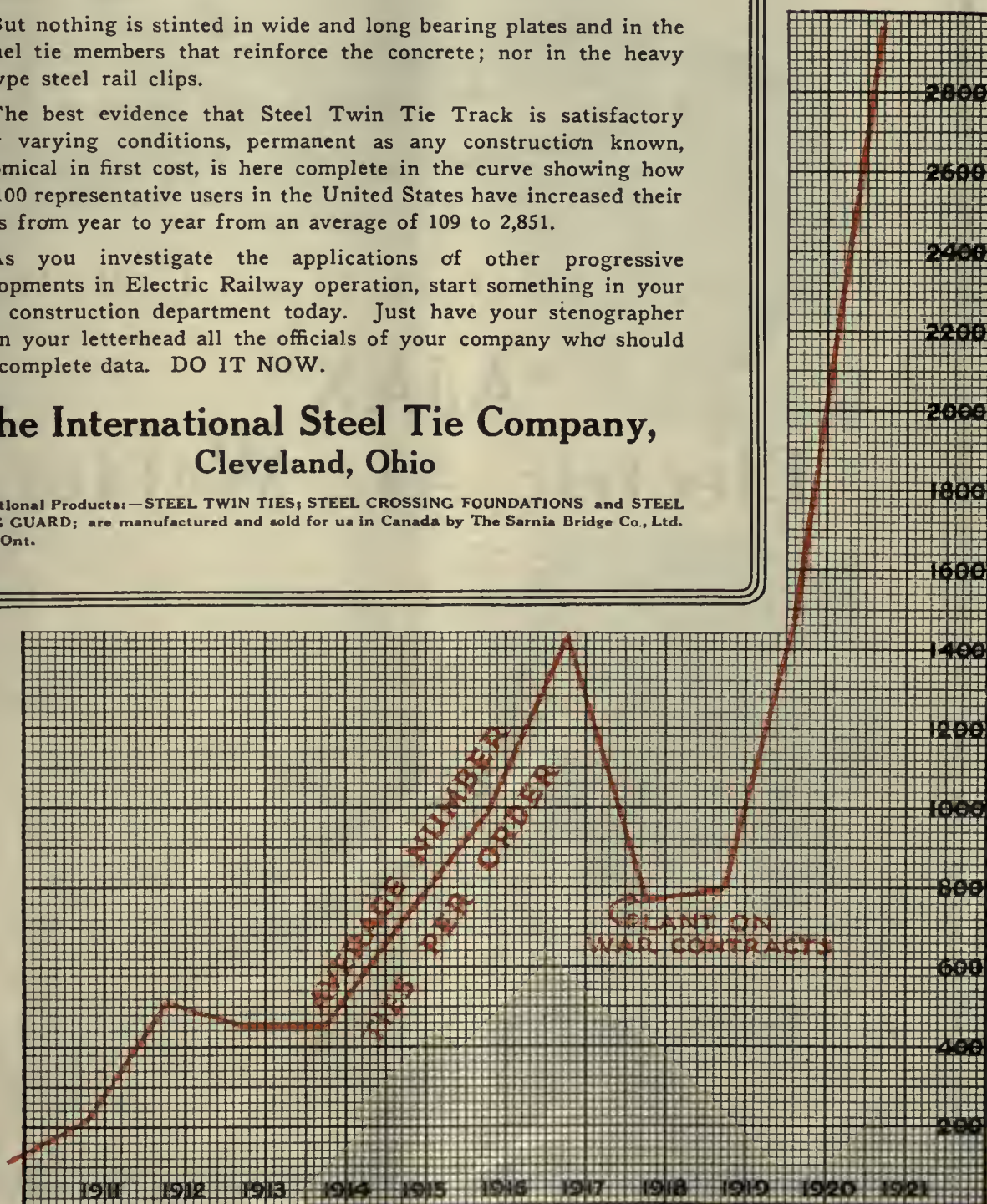
But nothing is stinted in wide and long bearing plates and in the channel tie members that reinforce the concrete; nor in the heavy jaw-type steel rail clips.

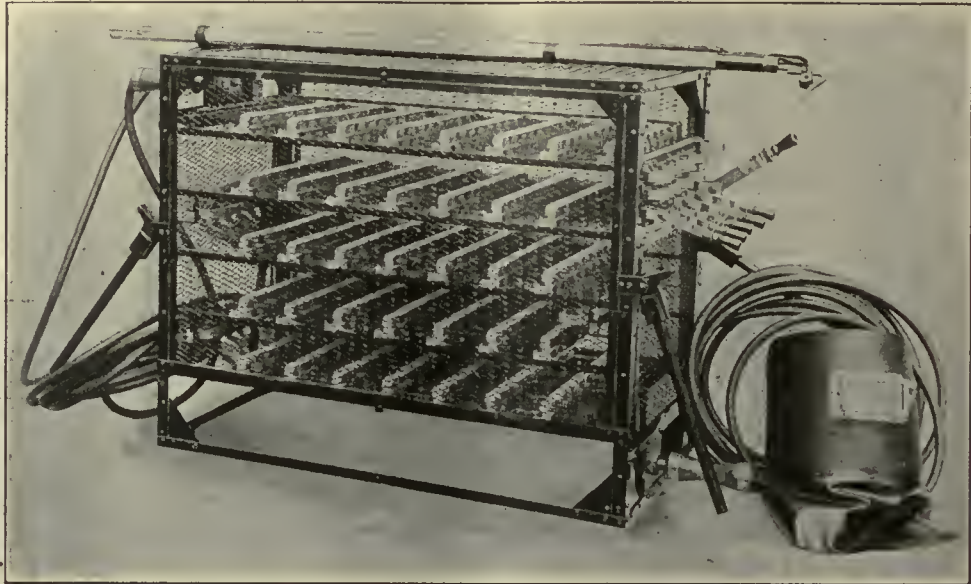
The best evidence that Steel Twin Tie Track is satisfactory under varying conditions, permanent as any construction known, economical in first cost, is here complete in the curve showing how over 100 representative users in the United States have increased their orders from year to year from an average of 109 to 2,851.

As you investigate the applications of other progressive developments in Electric Railway operation, start something in your track construction department today. Just have your stenographer list on your letterhead all the officials of your company who should have complete data. DO IT NOW.

The International Steel Tie Company, Cleveland, Ohio

International Products:—STEEL TWIN TIES; STEEL CROSSING FOUNDATIONS and STEEL PAVING GUARD; are manufactured and sold for us in Canada by The Sarnia Bridge Co., Ltd. Sarnia, Ont.





I N T R O D U C I N G

“AJAX”

Electric Arc Welder

Now offered after having demonstrated by three years of service that it is capable of safeguarding the reputation made by our Reciprocating, Universal and Atlas rail grinders. Among the features that will especially appeal to electric railway men are:

Portability—Weighs only 120 lbs. is 18 in. wide, 36 in. long by 28 in. high. Convenient hinged carrying handles. Can be transported on any car platform.

High Amperage means deep penetration—333 amp. at 600 volts, 209 amp. at 250 volts. Practically 50% higher capacity than any other re-

sistance machine on the market, ample for good welding under all ordinary conditions. Good also for carbon arc welding.

Accessibility—All parts easy to get at, all circuits plainly traceable, all repairs easy to make with unskilled labor.

Completeness—Equipment includes everything necessary to start work—no extras to buy. Even the face shield, trolley pole, cables and welding handle are included.

We are staking our reputation on the satisfactory performance of these machines. Write us for complete details and prices.

Railway Track-work Company, Philadelphia, Pa.

IMPORTANT

We claim that "Golden Glow" reflectors are not only by far the best, the most efficient and the most permanent reflectors at the present time offered for railway headlight service, but also that on account of the specially developed processes and machinery used in their manufacture they are the only accurately made, ground and polished parabolic glass reflectors on the market that can be manufactured and sold at a commercial price.

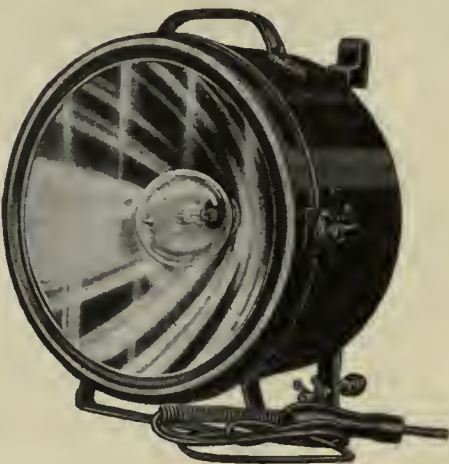
No headlight is a real headlight unless it has a real reflector. The headlight case is simply a container for the reflector.

When you buy headlights—buy the reflectors. Buy Golden Glow Headlights and get the best headlights at a reasonable first cost.

Write for Catalog Sheets



Type T Golden Glow Headlight, 9-in.
Reflector for city and suburban service.



Type T Golden Glow Headlight, 12-in.
Reflector for ordinary interurban service.

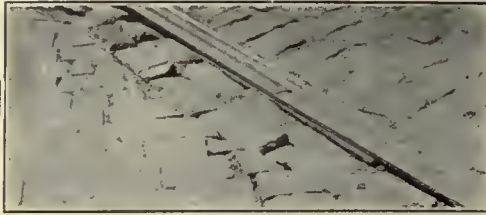


Type T Golden Glow Headlight, 14-in.
Reflector for high speed interurban service

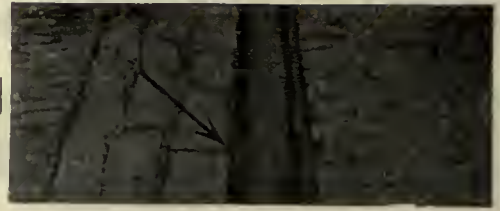
ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

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17th and Cambria Streets
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50 Church St.
CHICAGO
Monadnock Building
Branch Offices: Boston, Scranton, Pittsburgh Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto



Typical loose condition of pavement as result of cupped mechanical joint.



Themit Insert Weld installed in street. Joint and pavement troubles eliminated.

Cause and Prevention

The continual pounding of car wheels on mechanical or partially welded joints soon causes the joints either to shake loose or break.

The loosening or breakage of the joints causes the car wheels to pound them all the more, which in turn causes cupping.

The cupping of the rail joint causes the rails to loosen all the more.

The loosening of the rails at this point causes water to seep in.

The seeping in of water causes the pavement to loosen up, in the manner shown in the illustration.

The loosening of the pavement causes

necessity for making premature and frequent pavement renewals.

Loose and cupped rail joints cause the joint to be pounded to pieces.

The deterioration of the joint shortens the life of the rail.

Frequent renewals of short lived rails.

The frequent pavement renewals cause an excessive leak in your track maintenance expense

THERMIT INSERT RAIL WELDS

Prevent all these things

The superheated liquid steel produced by the Themit reaction effects a pure butt weld on each side of a white hot insert of the same analysis to that of the rail is placed between the rail heads.

After grinding, the result is a continuous surface of rail with the joint absolutely eliminated.

The elimination of the joint prevents cupping or breakage.

The prevention of cupping or breakage prevents frequent rail renewals and absolutely eliminates maintenance during the life of the rail.

Send for our latest Rail Welding Pamphlet 3932.

METAL & THERMIT CORPORATION

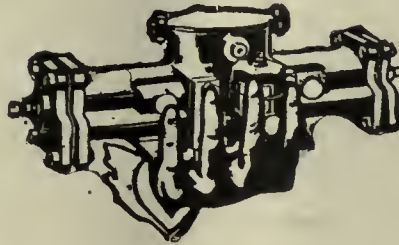
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*Modernize!**Pneumatize!*

For Better Horizontal Transportation

You don't see many of those old-time rope cable elevators nowadays, do you?

The control devices of the modern elevator leave little more for the operator's attention than the safety of passengers and accuracy of stops.

If such improvements have been found desirable in *vertical, fare-less* transportation, how much more desirable it is to minimize manual labor in *horizontal* transportation in which the need for safety and speed must be taken in connection with the further need for collecting a fare from each and every rider.

Having studied this problem in every detail we will be pleased to confer with you as to which of the following will best enable you to get more car-miles per hour and more money per car-mile at a decrease in both labor and accident cost.

National Pneumatic

Door and Step Control

Door and Step Operating Mechanisms

Motorman's Signal Lights

Safety Interlocking Door Control

Multiple Unit Door Control

Which can be adapted in whole or part to make your cars embody the last words in fastest, safest, most economical operation.

*Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
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National Pneumatic Company, Inc.

50 Church St., New York

Edison Bldg., Chicago

Works: Rahway, N. J.

WHAT COPPER WIRE BRINGS



COPPER PRODUCTS

*Round Bare Wire
Bare Strand
Trolley Wire—Round and Shaped
Flat and Square Bare Wire
Tinned Wire and Strand
Weather-proof Wire and Strand*

*Slow-burning Wire and Strand
Bus Bars
Copper in Rolls
Rolled Rods
Drawn Rods—Round, Square
and Rectangular*

BRASS AND BRONZE PRODUCTS

*Brass and Bronze Sheets
Brass and Bronze Round Wire
Brass and Bronze Flat and Square Wire*

Mills, Bayway, N. J.

AMERICAN COPPER PRODUCTS
CORPORATION
200 BROADWAY NEW YORK

TO the NEW HOME

A few lights in strategic places—

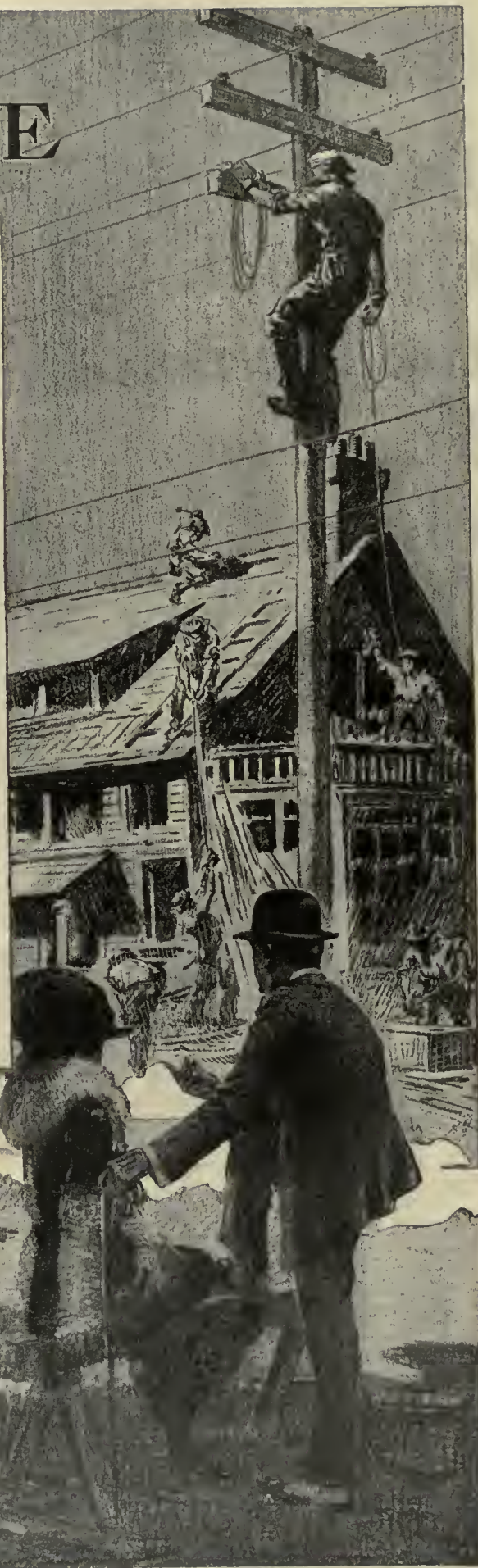
That is what "wiring" a house meant five years ago, and it included less than a dozen outlets.

Today the modern "Home Electrical" is often equipped with more than 100 separate outlets. Arrangements for every conceivable kind of device, for dozens of ceiling and wall fixtures, change the very character of the house and home.

These advances, like the advances now being made in *power* facilities, and the great hydro-electric developments planned to meet consumers' requirements, insure continuous demand for copper wire, call attention to the present state of the market and indicate the wisdom of purchasing wire for investment at this time.

Every day, proof of these facts arrives at our Bayway, N. J. Mills (formerly plant of Wacark Wire Co.), and today these mills are prepared for extensive operations in anticipation of greatly increased demands. Stranded cables, bare and weather-proof wire of all sizes, rods, bus bars, brass and copper sheets are there being produced in quantities that indicate a greater annual tonnage than any other similar plant in this country.

Volume production plus tide water location and unexcelled rail facilities, insuring quick deliveries, enable us to quote prices which we believe are of vital interest to every user of such products in the United States.

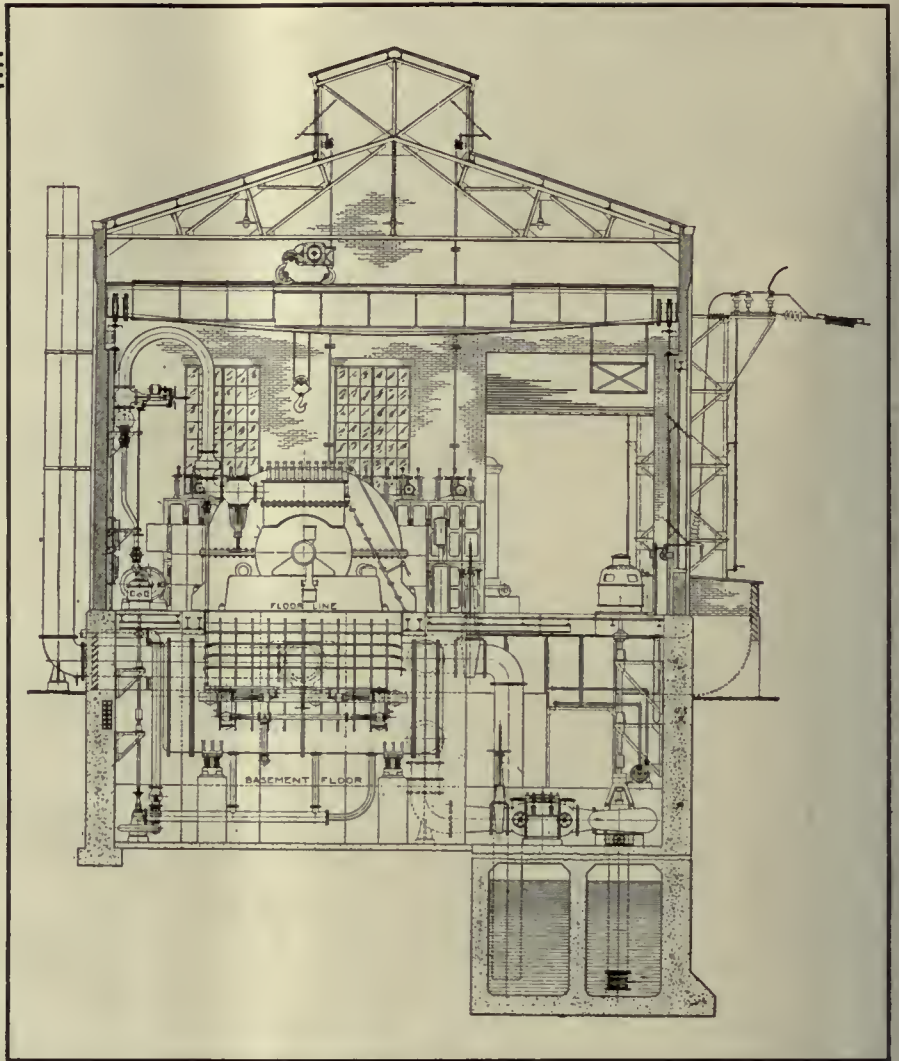


Don't Overlook the Main Function of the Power Plant

The one essential of the power plant is to supply electrical energy at the lowest possible cost.

A careful assembly of highest grade equipment in Unit Power Plant design insures lowest investment per kilowatt of capacity and requires a minimum number of operators. These designs provide for one level operation. All equipment is so arranged that one operator may have entire charge of each turbine unit including all its auxiliaries. All parts of equipment are easily accessible, thus facilitating inspection and repairs.

All electrical equipment including switchboard and auxiliary motors is located on main floor. This centralizes the control of the plant and insures reliable operation as well as minimum labor.



Well lighted and ventilated buildings insure efficient and reliable operation. Thoroughly fireproof buildings of lowest cost insure lowest possible fixed charges including interest, taxes and insurance. From time to time other features of Unit Power Plant designs dealing with essential parts of power generating systems will be shown here.

Our unit power plant designs permit building for present requirements and allowing for future extensions. A standardization of assembly has been effected based on years of experience which insures maximum value for minimum investment. The cost varies from the initial investment approximately in direct proportion with the installed capacity.

Without obligation or cost on your part, we would be glad to make preliminary recommendations on your problems. Write for Booklet A.

E. W. CLARK & CO., Management Corporation
Columbus, Ohio



Going a Step Further

Fifty years of specialization in one particular branch of the oil business — *railway lubrication*, has developed Galena Oils to a state of perfection that they are recognized everywhere as the highest grade railway oils possible to manufacture.

But it is not the policy of this company to rest content with the creation of *better lubrication*, hence the development of *better lubrication service*, as exemplified in the master organization of specialists known as the Galena Mechanical Expert Department.

The co-operation offered through the medium of this exclusively Galena Service is daily proving its value on hundreds of railways, by invariably securing results in efficient and economical lubrication that show quickly in improved operation.

Just as the efforts of duplicating Galena Oils have failed through lack of *quality*, so likewise have the attempts to copy Galena Service been made ridiculous by absence of the vital essentials of knowledge and experience.

*When Galena Service Goes In
Lubrication Troubles Go Out!*

THE GALENA-SIGNAL OIL CO.

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Offices in all principal American Cities

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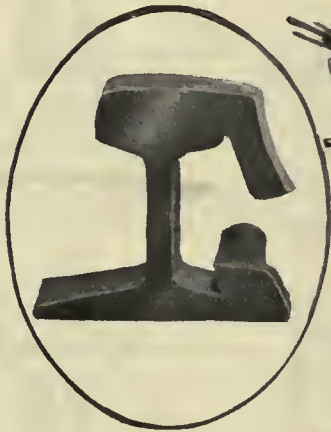
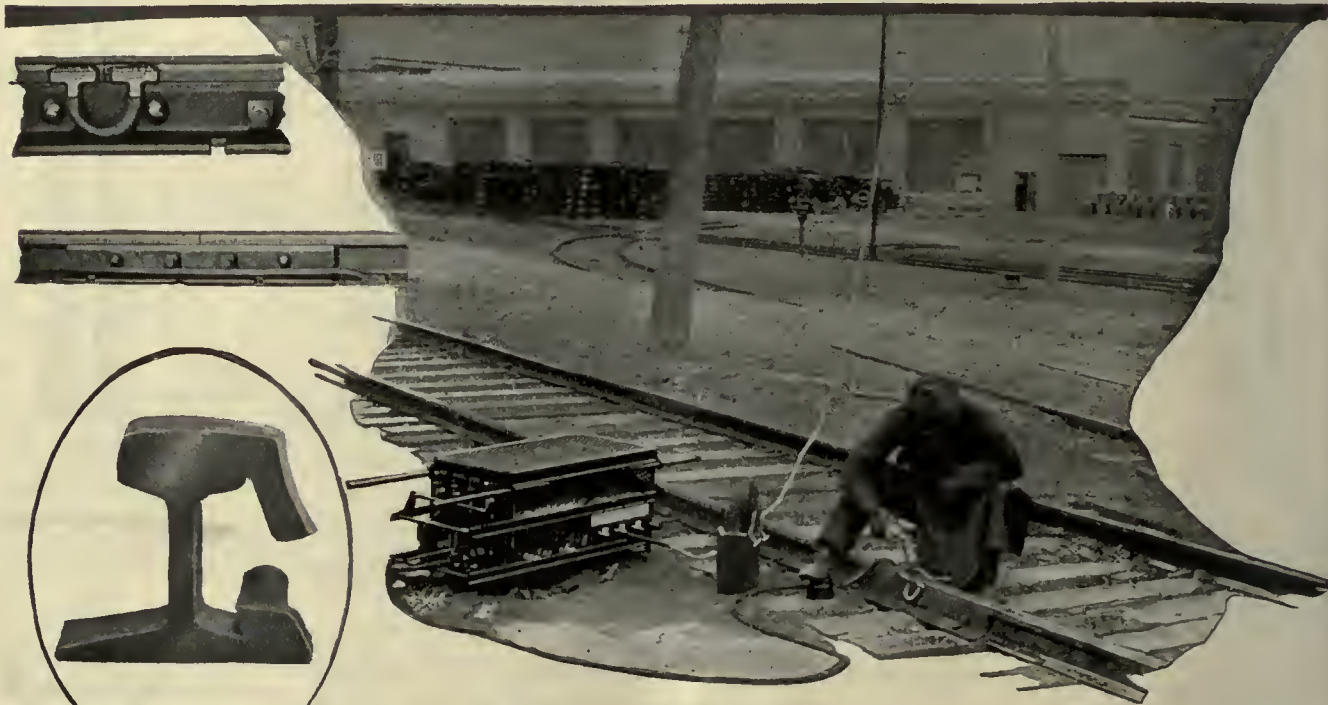
BUENOS AIRES

PARIS

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GALENA
SERVICE

A rail as long as the system and without a joint would be ideal for the power service of a street railway



SF-1 Arc Weld Bond
For attaching to
Rail Head



SF-4 Arc Weld Bond
For use with Weber Joints



SF-6 Arc Weld Bond
For attaching to rail base

Making Tracks "Jointless" with G-E Welded Bonds

Welding a bond to a rail today need not be the troublesome task of fusing copper with steel. G-E Rail Bonds have steel faces expertly arc welded in the factory to drop forged copper terminals. Thus a track welder merely makes the perfect steel weld he is used to, and the bond becomes an integral part of the track—wiping out the joint.

G-E Welded Rail Bonds, either U-shaped for rail heads or of the flexible, long type for spanning splice bars are the outgrowth of broadest experience in railway work. They can be supplied in forms to satisfy any need.

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General Office
Schenectady, N.Y.

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Consolidation of Street Railway Journal and Electric Railway Review

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Volume 57

New York, Saturday, June 25, 1921

Number 26

Government Reorganization Plans Show Signs of Life

PRESIDENT HARDING and his committee on the reorganization of the executive branch of the government appear to be making progress in formulating concrete plans and recommendations to present to Congress. Latest reports indicate that the President's principal recommendation is that bureaus and agencies be grouped according to their major purpose and that the purpose of each department be clearly defined. The committee says that it is already working along this line and reports of its own plans indicate that it has gone straight to the point and suggested a concrete grouping which is logical and which really is according to the President's definition.

All this is good. But it is a long way from such a proposal to an enacted law. The public must express itself, meanwhile, if results are to be obtained. As previously pointed out in these columns, pressure from his constituents is the most determining influence on a Congressman's vote.

This subject should be watched and pressure exerted when and where it will do good. The electric railway industry should benefit as much as any from the effects of an enlightened public consciousness of better economy and efficiency in governmental business. More important, this is the sort of thing that should be done and it deserves active support from individuals who should write to their Congressmen urging action.

The Bus, Like the Early Railway, Develops New Territory

TERRITORIAL expansion of communities can be accomplished only by some means of universal transportation. In the early '90s this was the field to which the promoters and developers of the modern, present-day electric railways directed their energies with so much success—not, perhaps, in the way of profit to themselves, but certainly in advancing the welfare of the community. They could not foresee the increased costs that have been placed upon these railways in the past half decade, either rendering them barely self-supporting or actually putting them on the scrap pile.

The large investment needed today to build railways precludes much if any extension until these construction costs can be reduced. But that transportation where it is needed will be furnished somehow, by individual operators or otherwise, is obvious when the many bus routes in the country are studied.

In this issue mention is made of a real estate development in Akron, the success of which depended solely upon having means of transportation. In order that the home owners in that territory might be able to get back and forth to their work and pleasure with some degree of ease and without walking a half mile or more to the nearest trolley car line, it was but natural for the promoters of the new addition to solve the problem themselves.

Thus it will go—when the need for transportation arises. The same form of development will occur in the '20s as did in the '90s. Transportation promoters will not, however, in this day and time put in the most expensive installation, but will carefully analyze the cost of doing business and will install that form of system which will give the greatest service at the minimum of expense. It may, at first, be a light-weight bus on a leisurely schedule; later on, a more elaborate bus proposition or a trackless trolley car, and then, when traffic becomes permanent and stable enough to warrant a larger investment, the trackway will provide the route.

Stand Up for Your Legal Rights, but First Educate the Public

THIS was the advice given to the managers of the New York State electric railway properties at their recent annual meeting by Judge John A. Barhite, formerly Public Service Commissioner of the State. According to the speaker the utility companies are apt to forget that their chief obligation to the public is to supply good service. There is a power, he said, which can change a franchise when constitutional rights are involved. This power, of course, may be exercised to protect either party to the contract.

This advice of Judge Barhite should not be overlooked. Railway men are too accustomed to think of a franchise rate as unchangeable, no matter what the conditions are under which it was granted or the time which it was supposed to run. In this impression, of course, they are like the public. There are a great many citizens who consider a franchise rate, at least when it is low, as sacrosanct. In no circumstances, according to them, can it be changed without the consent of the people served or their local representatives, no matter how long ago the rate was made or how conditions have changed since it was established.

In the address at the Lake George meeting to which reference has been made the speaker very wisely pointed out the duty of the utility operators, where cases of unremunerative rates exist, to explain to the public the rights of the utility in cases of this kind. A process of education of the public in cases of this kind is highly desirable. This explanation of the facts of the case should not be left until a crisis arises, as the process is one requiring time. This time should be shorter, however, than formerly, because of the many instances of rate increases during the past three or four years throughout the country, so that the public is better informed now of the legal status of rates.

While the legal situation was clearly defined at the Lake George meeting, railway companies should also realize that while, in certain circumstances, courts and commissions can raise rates, their power in one respect is very definitely and absolutely limited. They cannot compel the people to take the service at the charge permitted. For example, in transportation, when the rates are considered too high, the public or a portion of it

has the option of walking and perhaps of riding in jitneys and private automobiles. In other words, on many properties the legal limits are not the only ones which control a fare. Commercial considerations must also be taken into account. This affords still another reason for the educational program of publicity urged by Judge Barhite.

Eyes Are Again on Richmond; This Time the Trackless Electric Car

IT IS a marked coincidence that the trackless trolley exhibited at Schenectady on June 15 should be destined for Richmond, Va., where the first commercial electric line in this country was put into service. The trackless trolley is not new, as it has been operated to a considerable extent in foreign countries, but the rapid development of the automobile on the one hand and of the safety car on the other has made it possible to design a modern machine of this type that has great possibilities. In the trackless trolley vehicle that was exhibited at Schenectady is found a bus that is a combination of the good things of both the automobile and the electric railway car. By adopting the automobile chassis it is possible to eliminate expensive track construction and paving with its steel rails and fixed way, along with the weight and objectionable noise of metal wheels and grinding brake shoes. By adopting the pay-as-you-enter safety car body there is retained its desirable features in handling passengers and collecting fares. By adopting the electric motor as the drive no new maintenance problems of gasoline motors, with their clutches and transmissions, are introduced. And this is not all; the Schenectady trolley bus will, it is said, operate at a cost at least as low per car-mile as any automobile bus or electric car yet developed, and it is, therefore, economically sound.

Now what is the field for this new trackless trolley? There is of course no ground to assume that it is going to replace the electric car or the gasoline bus under all conditions, but its practicability for new extensions and feeders to electric lines is at once apparent to all. Then there are those thousands of communities in this country that have grown faster than the electric railway facilities. There are also those communities whose growth has not been in the directions anticipated. It is not unusual to find examples in which a car track may be on one side of a town, which was the proper place for it when first constructed, but now all the development has taken place on the other side. Simply by the erection of a pole line and trolley, the trackless trolley may be run through the newly populated section and then over the route where there are already tracks and the original trolley line; in fact, the trackless trolley car may be sandwiched right in with the regular cars. Again, there is the single-track line that should have more service, but on which it is impossible to put any more electric cars on account of the lack of the necessary turnouts. Maybe the expense is too great to make it pay to install the other track with paving costs added, or it is not possible to get the extra track at all on account of the necessary franchises. But, with the trackless trolley, all that is necessary is to install an additional wire and operate additional service.

No doubt there will be improvements made on the trackless trolley as shown at Schenectady on June 15. But the fundamental idea is sound and the trackless trolley bus will undoubtedly be a factor in the transportation of the future.

Patrons Converted Into Defenders of Road

CONTROVERSIES often rage over trifles. Every commuter knows this. It is borne in upon him from all sides. It is his pride in his home town, his pride in his garden, his pride in his isolation, that makes the commuter quick to resent any implication that he and his are not the best. All this is highly desirable, more so when this tendency jealously to guard the things he considers peculiarly his own manifests itself in the defense by the commuter of the railroad that carries him back and forth daily.

This is just what has happened in New York. The Transit Commission there has been giving out figures of passenger movement, claiming for the Flatbush Avenue Station of the Long Island Railroad the heaviest suburban traffic. Last year 33,966,092 passengers passed through that one portal to the metropolis. This is certainly a formidable army of the suburban species, but it does not constitute a record. At least Lewis Saxby says so. And in substantiation this commuter-stockholder-statistician contends that even the combined traffic of the Grand Central Station and the Pennsylvania Station is about 22,000,000 passengers fewer per year than the traffic of the Hudson tubes.

Few places there are that have figures to offer to compete with these imposing and, to some of us, staggering totals, but then, as Dr. Einstein says, it is all a matter of relativity. The relativity may not be readily discernible. It seldom is. If it were, a professor wouldn't be needed to point it out, and the need would not exist for applying to it a term that probably Mr. Edison had to look up for its meaning when the savants dragged it forth into an unsuspecting world. But the relativity is there.

The Hudson & Manhattan Railroad, "Hudson Tubes," has been a personally conducted line ever since the days of William G. McAdoo. This has borne fruit. The case of Mr. Saxby is not an isolated one. It is merely another manifestation of the spirit that makes the rider on this line consider the property to be peculiarly his own.

If Mr. Saxby hadn't thrown down the challenge some one else would have taken up the cudgels in behalf of the railroad. Of this there is no doubt. And how much better it was for the company to have one of its patrons spring to its defense than for the company itself to sing its own praises! Readers of the ELECTRIC RAILWAY JOURNAL may not have any immediate concern with the totals of passengers involved in this controversy, but they do have an interest in the spirit of service behind the Hudson & Manhattan Railroad operation which converts patrons of that line into quick defenders of the road and all that it stands for in management and operation. Therein lies the lesson that may be well learned by others.

Careful Perusal of the Index May Save Waste of Effort

THE index appears in this issue. The publishers of this paper have always paid special attention to the compilation of the semi-annual index, and to insure the receipt of it by every subscriber a copy for each semi-annual volume is bound in with the last number of that volume. In consequence, the index for Volume 57 appears in this issue.

A few words as to the method of compiling the index

may not be out of place. It is essentially one of subjects and not of titles. For this reason an article which discusses a number of subjects may have an equal number of entries in the index. Articles relating to individual companies are indexed under the names of those companies and a list of the principal key words which have been used is given in the instructions for the use of the index.

There are many ways in which the occasional reading of back copies of a periodical like the *ELECTRIC RAILWAY JOURNAL* will help the active worker in the industry and in such reading the index is a great help. One way, for example, especially with an industry which, like that of electric railways, has grown rapidly, is to disclose ways in which different problems have been approached. An engineer or transportation official to whom a problem is presented for solution may think that he is the first to whom this question has been presented, when actually it may have had to be considered in approximately the same form on other properties. This, if recorded in this paper, would be disclosed by the index, and the searcher for the answer to his question would find it had been considered in earlier years. Even if the problem were not the same in all respects, a new aspect and help may be gained by a study of the ways in which previous investigators have attempted to do the same work.

Another advantage of the occasional perusal of back volumes and indices is the perspective of the industry gained thereby. By the space given to different topics in both the bound volume and the index, one may be able without difficulty to appraise the importance which these topics seemed to have at the time. Often those that became relatively unimportant for a time appear again in the front rank, an example of the adage "history repeats itself." Patent attorneys declare that there would often be a saving in time and money spent in research to rediscover old inventions and resurrect old ideas if investigators first made a study of the prior knowledge of the art. This is undoubtedly equally true in the case of subjects and methods which have been found to be not patentable.

Still a third benefit of the practice of using the index and back volumes is to refresh the memory and to acquire information about events and methods the articles concerning which were not read at the time they were published. Whether this was because of a lack of time or opportunity, the result is the same. The quickest way for a person who has been out of the country or otherwise separated from the industry quickly to get an understanding of what has passed is to review the back copies and indexes of periodicals. In fact, any reader who binds his copies of the paper regularly and gets the habit of frequently consulting these bound volumes for specific topics by means of the index or looking over them, even if not in search of some definite data, will find that the numbers possess much of interest and value of which he had hitherto no conception.

Essentially the Interests of the Public and Electric Railway Are Identical

LAST week the Pennsylvania Street Railway Association held its annual meeting at Harrisburg; the gathering was large and the spirit of the discussion was good. However, there was nothing remarkable in the size and spirit of the gathering, as the same might be said, and is said, regarding many other meetings; the remarkable thing was the program. Included in the list of speakers were the president of the American Electric Railway Association (who spoke twice), the chairman and the chief engineer of the State Public Service Commission, the State Librarian, and the field secretary of the State Chamber of Commerce, not to mention some well known electric railway men.

Forgetting for the time being the excellent technical papers which were read and discussed, the industry can gain much from a study of the addresses of these speakers from outside of the association. Abstracts of their addresses as well as of the other proceedings of the meeting will be given in an early issue of this paper. The impressive thing about the whole discussion on public relations was the way in which the fundamental unity of interest of utility and patron is coming to be understood. To illustrate: Chairman W. D. B. Ainey of the State Commission showed in his address that the welfare of the electric railways is a matter of real concern to this regulative body, which is handicapped in its constructive task in part by the contracts which the railways themselves entered into in the early and supposedly palmy days, and by the lack of provision for financial jurisdiction as regards the issuance of securities. Dr. F. H. Snow, head of the engineering department of the commission, also showed a sympathetic interest in the welfare of the utilities, pointing out how intimately the local and national problems in this field are related. President P. H. Gadsden of the American Association, speaking from the railway point of view, demonstrated that in permitting economic conditions to exist which make it impossible for the railways to extend and otherwise improve service the public is hampering its own development. He saw difficulties ahead in the direction of getting new money, but was optimistic with respect to the future, if the public will allow a reasonably liberal and prompt payment of the deferred returns to the holders of securities. Finally, D. M. Casey of the State Chamber of Commerce pleaded the cause of the electric railway as if he had been a railway man himself. His theme was really the essentiality of electric railway transportation, and he presumably reflected the attitude of the modern business man toward this vital public service.

All this is very encouraging, especially if it gets to the ear and eye of the public. The electric railway man may well pass on to his patrons the good things said of the utilities by their own representatives, as well as the inside facts of the business which only the electric railway men themselves know at first hand.

Quotation from the Federal Electric Railways Commission Report

No. 26

WITH capital and labor performing their respective parts freely and well, restrictive regulation would be unpopular, and the demand for the substitution of public ownership and operation for private management would shrink into relative insignificance. The test of private ownership and management lies in the solution of these two problems of credit and co-operation. These problems must be solved, and if no solution is practicable under present ownership and control, then the only course open is the complete transformation of the electric railway industry into a governmental business. Each member of this commission believes that credit can be secured and private operation maintained under public supervision.

Pioneer Trackless Trolley Installation

The Experimental Richmond Trolley Bus Operates in Conjunction with Rail Service to Demonstrate Its Worth and Flexibility and to Compare Costs of Operation Under Like Circumstances—Details as to the Construction of the Bus Compare Favorably with the Modern One-Man Car—A Special Type of Overhead Construction Needed for Its Operation

THE trackless trolley bus tested in Schenectady on June 15, as described in the issue of this paper for June 18, has been put in operation in Richmond, Va., by the Virginia Railway & Power Company. In May, 1888, thirty-three years ago, that city saw its first electric car. Now in 1921 the transportation world looks to the same city for information regarding the operation of the trackless trolley.

While this is not the first installation in this country of a rail-less vehicle propelled by electric motors taking power from two overhead wires, it is nevertheless the pioneer installation where a trackless vehicle has been used. The "Trollibus," so called by its builders, the Atlas Truck Company, has a body somewhat similar to that of the standard safety car mounted on an automobile chassis of special design.

The vehicle, according to C. B. Buchanan, general manager of the railway company, who is largely responsible for its design, can very readily be converted to operate over a grounded track return circuit such as is found in almost universal use throughout the country today. To accomplish this it is only necessary to replace the solid rubber tires with steel flanged rims to fit the track gage and substitute for the sliding contact shoes on the trolley a wheel or shoe to take current from the overhead trolley wire.

The machine as built, however, will operate on a track return circuit, even though equipped with rubber tires, by having an adapter, so called, attached to the collector for connection with the standard overhead trolley wire and engage a shoe which fits into the trolley track groove to give the necessary ground connection.

The route in Richmond over which the "Trollibus" operates is purely for determining its possibilities and extends along Floyd Avenue, a street over which the Country Club car line also operates. A negative wire has been installed on this route for a distance of one mile, so that the bus really supplements rail service on that part of the route. Among the reasons for supplementing the car service was to demonstrate the ease with which the rail-less vehicle could maneuver in traffic, as well as to compare its cost of operation and

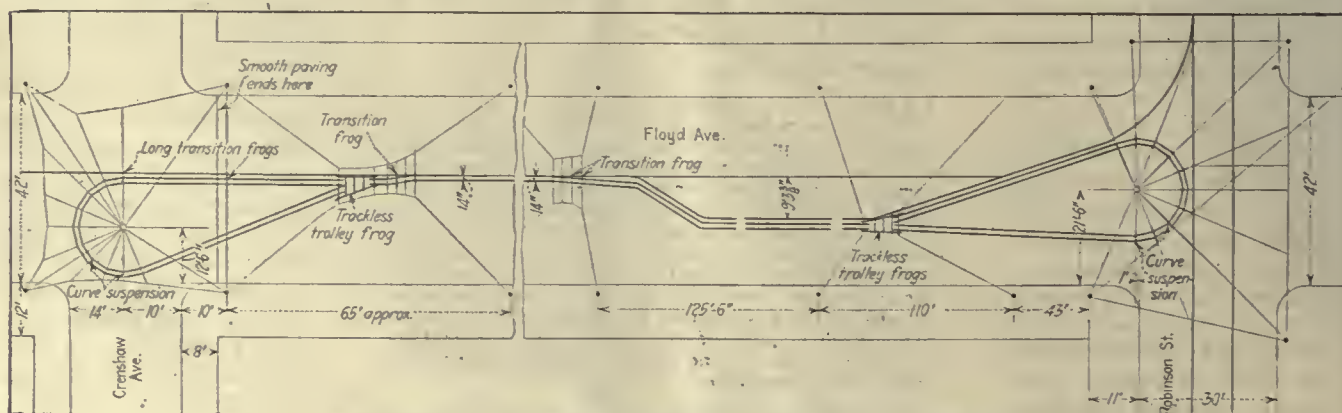


UPPER END OF BUS ROUTE ON FLOYD AVENUE, RICHMOND, WHERE BUS TURNS BACK

popularity with other transportation units. Cost analyses as to operating expenses are being made from all operating data and a careful check is being kept of the passenger traffic in order to obtain an index as to its popularity. Operation over this route also gives the city officials an opportunity of deciding for themselves whether or not other permanent routes should be approved for operation solely with this type of vehicle.

The "Trollibus," which resembles very closely the one-man prepayment car in that each has the same seating capacity, combines several of the good features of light-weight body construction, electric motor drive, mechanical door control and prepayment fare collection with the flexibility of the automobile chassis and to some extent the mobility of self-propelled vehicles, to furnish ammunition with which a railway company can combat free lance competition with a minimum of investment and cost of operation.

Since there are no rails to complete the electric cir-



LAYOUT OF ROUTE ON WHICH TROLLIBUS OPERATES

cuit; two overhead wires are used to form an all-metallic circuit. The wires are strung parallel, 14 in. apart, and doubly insulated with porcelain ring insulators. The two wires are held in position by a spreader. The proper installation of the necessary overhead calls for a new complete line of fittings with the exception of the trolley ears and studs. Several accompanying views, some of which were taken while the bus was on the experimental track in Schenectady, show the hangers used on tangent stretches as well as the pull-offs necessary on curve construction.

GENERAL DESCRIPTION OF THE CHASSIS AND BODY

The chassis, which has an over-all length of 22 ft. 9 in., can be rated as of 5 tons capacity. The frame is constructed of steel channels, which weigh approximately 13 lb. per ft. and are reinforced with gussets at the corners and at all intersections with cross members.

rear springs are 56 in. in length and have sixteen leaves.

The front axle is an I-beam section and carries 50 per cent of the weight of the bus. The rear end is a standard 5-ton Sheldon worm-gear drive which is connected directly by universal joints to the propeller shaft.

Cushion wheels of the Mead type, built by the American Cushion Wheel Company, are used exclusively. On these wheels are mounted 36 in. x 6 in. Kelly-Springfield solid rubber tires of the caterpillar type. Much has yet to be learned as to the type of tire best suited for trackless trolley operation, and by no means can it be said that any one type is to be used until experiments of sufficient duration have been made in actual service to prove durability and minimum cost per mile. The track tread of the tires as mounted on the wheels is 58 in. measured center to center. This is 2 in. wider than the standard track gage.



THE EXPERIMENTAL ROUTE IS ALONG FLOYD AVENUE THROUGH THE RESIDENTIAL DISTRICT—THE BUS, WITH ITS LOCAL ENVIRONMENTS, WILL SOON BE A FAMILIAR PICTURE

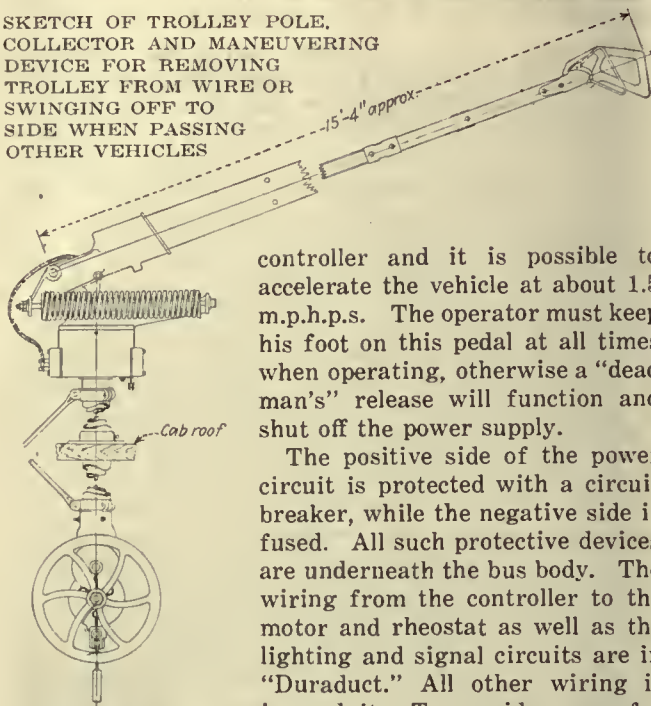
The distance between the side members is 34 in., which provides ample room for hanging the motor in between. To the frame is also directly attached the body, which is constructed of steel uprights on 26½-in. centers and rolled steel car lines that give an arched roof effect very much similar to that of a limousine body. The body is paneled below the window sills with ¼ in. Steelsote and the roof material is Three Star Agasote.

With the body so mounted a semi-flexibility is obtained that is not found in general street car practice, where bodies are built rigidly with side sills and mounted on rigid trucks. The semi-rigid body and frame are supported on half-elliptical springs mounted directly on top of the axles, using the standard Atlas truck method of suspension. The front springs are 50 in. long and 3 in. wide with twelve leaves, while the

Power for propulsion is furnished by a standard GE-258 ball-bearing ventilated railway motor, a type that has been largely used for driving safety cars. This motor is so supported between the side frames that it can be direct connected to the propeller shaft by a universal, in about the same manner as an automobile gear drive shaft is connected.

The operator or driver operates the controller by means of a foot-operated RZ type of controller, a detail view of which is presented. By pressing down on the pedal lever, which is mounted in all respects similar to the automobile clutch foot pedal, the driver can actuate the controller point by point by alternately pressing on and releasing pressure on the foot pedal. As the pressure is released, the pedal moves upward and a "dog" catches in the next notch. There are five points on the

SKETCH OF TROLLEY POLE, COLLECTOR AND MANEUVERING DEVICE FOR REMOVING TROLLEY FROM WIRE OR SWINGING OFF TO SIDE WHEN PASSING OTHER VEHICLES



controller and it is possible to accelerate the vehicle at about 1.5 m.p.h.p.s. The operator must keep his foot on this pedal at all times when operating, otherwise a "dead man's" release will function and shut off the power supply.

The positive side of the power circuit is protected with a circuit breaker, while the negative side is fused. All such protective devices are underneath the bus body. The wiring from the controller to the motor and rheostat as well as the lighting and signal circuits are in "Duraduct." All other wiring is in conduit. To provide power for

the emergency lighting of the bus body, the headlights and tail-light a 120-amp.-hr. storage battery is carried. This is charged as the bus operates by a 12-volt generator direct connected to the motor shaft.

CURRENT-COLLECTING DEVICE

Power is taken ordinarily from the two overhead wires by a specially designed collector, details of which are shown in one of the accompanying illustrations. This collector, which weighs but 16 lb. exclusive of the base, has two sliding shoes with approximately 12 in. free space for each wire and makes the over-all width of the collector shoe 28 in.

By the use of this form of collector, which has a

spring tension of 25 lb., it is possible for the driver to get off center about 9 ft. before the collector will pull off the wires and leave the bus "dead."

The operator can maneuver this collecting mechanism from inside the trolley bus. A vertical wheel which actuates a lever operates against the tension spring and makes it possible when one bus vehicle passes another, utilizing the same trolley wires, to clear the line and allow the one met to proceed. Afterward the current collector can be replaced on the wire and the bus proceed on its run.

When necessary or desirable, as on returning to the car-house at night or for

repairs, the bus can be made to operate on a standard 600-volt trolley circuit. A short-circuiting sliding contact trolley shoe is inserted in the collector, which provides the positive side of the circuit. To get a ground or complete the circuit a metal shoe is fastened to the body frame and dragged along the top of the grounded track rail. By this means it has been found possible to operate the bus at a speed of 8 or 9 m.p.h.



INTERIOR VIEW OF CONTROLLER, SHOWING HOW FOOT PEDAL FUNCTIONS WITH RATCHET AT BOTTOM OF CYLINDER SHAFT



AT LEFT, NO DIFFICULTY IS EXPERIENCED IN PASSING VEHICLES ON THE ROADWAY; AT RIGHT, TROLLEBUS TAKING 90-DEG. CURVE. NOTE THE SYSTEM OF OVERHEAD TROLLEY CONSTRUCTION

The interior finish of the bus, as well as the entrance and location of the apparatus for operation and fare collection, is shown in one of the accompanying illustrations. The seating capacity is thirty and with fifteen standees the maximum safe loading is considered forty-five. On the basis of the seating capacity this allows 5½ sq.ft. per seat. At 150 lb. each for the passengers and also including the driver, the live load is 6,900 lb. The over-all length of the vehicle is 24 ft. 8 in., which corresponds to a linear length of 0.822 ft. per passenger seat, as compared to 0.935 ft. with the Birney standard 28-ft. safety car. There are three cross seats and one short longitudinal seat for three passengers on each side of the bus. In the rear is a semi-circular seat large enough to accommodate twelve passengers. The seats are bolted to the body floor and are upholstered in leather and are spaced on centers of 28 in. with an 18-in. aisle. Ventilation is provided by running an air duct on each side above the top of the window sash next to the roof the entire length of the car with an air intake at the front. This duct is perforated with small holes around each of the lamp sockets used to light the body to form an ornamental design. No card advertising racks are carried.

There are two illuminating systems, one on the trolley circuit and the other on the storage battery circuit. The trolley circuits consist of two five-light, 23-watt frosted globes mounted directly over the tops of the windows. The other is an emergency circuit and utilizes current from the 8-volt storage battery. Only three lamps are on the latter circuit, one over the entrance, one over operator's head, the third over rear door.

The entrance and exit are at the front on the right, with doors manually controlled by the operator. The two-leaf folding doors can be opened inwardly so as to give a clear opening of 34 in. At the rear of the bus body is an emergency door.

The steps are entirely within the body, so that with the doors closed there is no opportunity for any one to ride on the outside of the vehicle. The height of the first step from the ground will be from 13 to 15 in., depending on the street level and the number of passengers on the bus. There are two 9-in. risers and a 2½-in. ramp to the level floor, which is about 35 in. from the ground with the bus loaded.

The curtain fixtures are those of the National Lock Washer Company, while the curtain material is pantafoote. A Faraday buzzer signal system to the operator is provided for the convenience of the passengers. Two Golden Glow headlights with 21-c.p. lamps are mounted on the front dash and operate from the storage battery.

The side windows can be pushed up 16½ in. so that a passenger has a clear vision. Other accessories include roller destination signs, mirror for operator to maneuver the trolley, Johnson farebox, light switches, etc.

The interior of the car is painted with white enamel above the tops of the windows. The outside is olive green with a gold stripe.

The second Simplon tunnel in Switzerland is reported to be nearing completion. Less than a half mile is still to be completed and about one and a quarter miles of rails to be laid. The electric cable transmission line on the north side has been completed and that on the south side is under construction. It is expected that the tunnel will be ready for traffic in December of this year, by which time the Italian section will also be ready for service.

York's Trolley Bus Service

TROLLEY bus service, according to the *Tramway & Railway World*, was recently established in York, England, over a 1.25-mile route with four vehicles comprising the equipment.

Some of the points that led up to the installation of these buses was that the experience of various authorities with gasoline motor omnibuses upset the optimistic expectations of those who overlooked the disadvantages of the internal combustion engine. It was found that repairs were numerous and costly, that frequent overhauls reduced the annual mileage, so that the useful life of a motor bus was somewhere near five years. Then, finally, just when revenue was being swallowed up by expenses, the price of gasoline increased until the cost of fuel alone reached the abnormal figure of 8 pence (16 cents at normal exchange) per car-mile, and many services that had been launched with the hope of profits were actually operated at a loss.

There are no severe grades on this route in York, but the service is conducted over some of the very narrowest streets in the city, having numerous sharp bends and turns. As a result, the vehicles have the narrow over-all width of 6 ft. 3 in.

As the buses cater to very light traffic, they have been designed on the "one-man" principle, using fare boxes. The driver's vestibule is inclosed and has an entry on the off-side. The cars are of the single-deck type and have a seating capacity of twenty-four.

Motive equipment consists of two 23-B.h.p. motors arranged for series-parallel control and two cam-control trolleys. Cars can deviate 17 ft. off center without risk of dewiring.

Another Advantage of Electrification Emphasized

THAT smoke was not only a nuisance but was an actual source of danger was brought out in a paper on the safety hazards of the New York Central Terminal equipment by H. M. Balliet, assistant terminal manager, Grand Central Station, read before the American Society of Safety Engineers on May 27. He showed by means of pictures how dense the smoke in the old Park Avenue tunnel used to be, with the large number of steam locomotives in operation for both through trains and for switching. On certain days, when the air was still and heavy, the tunnel, filled with smoke that refused to dissipate, would be made nearly impassable. At these times the tedious and dangerous practice had to be resorted to of passing an incoming or outgoing train along from flagman to flagman, usually twenty or thirty being required to furnish any degree of safety. The hazard involved in this sort of train operation was great, especially for the yard men and those engaged in the signaling. Train operators who have worked under the new conditions, Mr. Balliet said, realize how many of the former ubiquitous hazards have been corrected by electrification.

In remarking on the hazards of various parts of the electrical installation, Mr. Balliet mentioned how successful from the safety standpoint the type of third-rail construction employed had been. The New York Central third rail is of the under-running type and the cross-section is symmetrical with respect to both horizontal and vertical axes. Because of the wooden sheathing, it is very seldom indeed that any one comes into contact with the rail.

Merchandising Transportation

This Is the Second of a Series by the Author on This Subject—The Topic Particularly Considered in This Issue Is the Education of Trainmen Along Salesmanship Lines and the Illustrations Are from Advertisements Published by the Company or from Bulletins or Letters Sent to Its Men

By W. H. BOYCE

General Manager Beaver Valley Traction Company, New Brighton, Pa.

SOME writer, in defining salesmanship, says: "It is simply making the other fellow feel as you do about what you have to sell." So your job, Mr. Manager, is cut out for you. You must sell the idea of salesmanship to your employees so that they may sell the actual service to your public.

Some trainmen on entering the service do not seem to have been taught the rudiments of courtesy, so you must first teach them to show the proper respect to your passengers, the source of your and their income.

If your employees are courteous and polite, the impression is good. If too short with answers, or other than attentive, the opposite is true. You cannot afford to keep in the service men who would cause the opposite to be true. Indifference to the public on the part of your employees is a very serious blight on your business.

Every employee should be encouraged to acquire a personal reputation for good manners as well as good deportment. They are your personal representatives.

Any conductor who is oversensitive will never be a good salesman. He must be able to take a rebuff without taking offense or without losing his temper.

Interested, careful, safety first, attentive, cleanly, obliging and courteous trainmen will make for more car riders and thus assist you in selling more car rides.

Street railway employees come in closer contact with the public than the employees of other utility companies. Any person accepting employment must obligate himself to do all in his power to prevent disputes. He must be required to be courteous under irritating circumstances and polite under criticism of persons unfit mentally to criticize the service either intelligently or constructively.

On the Beaver Valley Traction lines we have kept before us the idea that the first principle that should contribute to the success of the sales organization is honesty—honesty in dealing with the members of the organization and instilling in them a sense of duty and honesty both to employer and the public.

We have spent considerable time and effort in teaching our employees what we consider proper transportation selling methods and to this end have issued an employees' service code, supplemented by frequent personal interviews and personal letters, and circular or individual letters mailed to employees' homes.

Salesmanship is something more than a science and an art. It is a principle—a principle of human relationship. It is the principle of the influence of one person or persons on another person or persons. To sell we must make the other fellow feel as we do about what we have to sell.

"WE NEED YOUR HELP"

If you do not like your job here—*tell us why.*

If you know anything that will improve our service—*tell it to us.*

If you know nothing but scandal about your fellow employees—*keep it to yourself.*

If you know of violations of rules that endanger our passengers or service—*tell it to us.*

If money matters have become a worry to you—*tell it to us.*

If you have money to invest and are offered stock the value of which may be in doubt—*tell it to us.*

If you need legal advice, banking advice, family budget advice, property purchase advice—*tell it to us.*

If there is sickness in your family—*tell it to us.*

It's a Pull Together Idea, Boys We'll Go the Limit for You

If well, sick, worried or in debt, or you have an idea that will help your company—or anything we can do, get or learn for you the door is wide open—walk in and TELL US.

That'll Help You and Your Company

The Beaver Valley Traction Company.
Pittsburgh & Beaver Street Railway Co.

W. H. BOYCE, General Manager.
H. O. ALLISON, Safety Engineer.

October 13, 1919.

Mr. P. F. Householder, Vanport, Pa.

My dear Householder:

It's costing us about \$6.25 to talk to you in this manner. I am doing it, though, expecting that the ultimate result will justify the expenditure. I am sending it to your home, where you will have the leisure to give it the consideration it deserves.

It is a present day issue that the careless and incompetent men cannot long retain a position with a worth-while concern and I want every man on these lines to be a careful Safety First man.

Now, this is an all-together movement. I will do my best to help you understand and act in the manner to prevent accidents and accident chances. I will bear with, advise with, and support you in learning, and hope for efficiency on your part as a reward. I will just as earnestly make an effort to weed out the hopelessly incompetent, for they are a detriment to all of us employees and to the company. I want you to note inclosures herein. I want you to understand these letters and my motive as both are to your interest, and in understanding and acting reap the benefit.

No, "Allison does not report you." He is permitted to tell you the better way. Your record speaks for itself, and bear in mind that when "Allison says this or that," as you may hear from some who have been cautioned, it is a very good idea for you to adopt his suggestion. It may save you an accident. If you can make a suggestion to me that will prevent an accident you can bet your best lantern and last week's pay that it will be adopted. Watch for these letters, discuss them with the wife, if you have one. Discuss them among your fellow employees, or me if you desire, but let them soak in and get under your hide for they mean what they say.

Very truly yours, SAFETY ENGINEER.

Approved: Superintendent.

Our ideas of how to sell the service idea to employees is best illustrated by the accompanying examples of talks to the men and the public.

The things kept in mind have been:

1. To make our employees realize the different kinds of competition that we face.
2. To have them make the passengers' ride as pleasant as possible.
3. To have each employee acquire a reputation for good manners.
4. To aid the employee to enjoy his work.
5. To teach each employee to control his temper.
6. To help him to obliterate his self-consciousness and devote all his energies to his duties.
7. To obtain his co-operation.
8. To help him constantly to improve himself.
9. To have him be civil, kindly and thoughtful in his actions, considerate of the welfare and wishes of others; in other words, to be courteous.

In order to live you must sell car rides. Your auditing or stores department may be weeks behind. Your purchasing department may secure inferior materials. Your finances may have been mishandled. And yet for a time you would be able to run cars and sell rides. But to shut off all car riders, all revenue, how long will you be able to operate?

Think it over.

Be a motor car, not a trailer.

Extracts from Employees' Service Code

INCREASING BUSINESS

Increasing business on the street cars may sound funny to you but it can be done.

Every time you run past an intended passenger you create a feeling that results in his walking.

Every time you are late people walk.

Every time you miss being at the depot stop when the train comes in people walk.

Every fare counts against you, as the fares pay your wages, and I get mine from the same source.

PASSENGER PAYS YOU

The greatest service existing in your work is the service the passenger gives you. Funny, isn't it? True enough. I said he paid your wages. That's mighty important to you—mine are to me anyway. So, every service you can give the passenger will not be any more than he is entitled to—remember that.

But few of the passengers consider you except in the way you serve them in their transportation needs. Do your duty by every one and when the day comes to a close you can in content spend the evening with the folks at home. Violate the rules and circulate your grouches and things won't be pleasant here nor at home.

SOME WALK—SOME RIDE

There is no "have to" about it any more. Those who can, walk when you are not there. Many others buy Fords or automobiles, and if luck is with them "get there" without using the street cars at all.

So you see that we have Competition.

Good business demands that we meet that Competition with something better. There's where your job begins.

HOW YOU MEASURE UP

Let me tell you that the passengers are more valuable to us than you are. We cannot get along without the passengers.

So, put in the background or shelve any idea you may have or had that you are the king pin. You are not—neither am I—the passenger is the important party.

Don't forget it.

THE PASSENGER

What if some of them are cranky and want to "bawl you out" for a mistake of yours that you did not intend to make but did it and it brought forth the passenger's rebuke? Wait until he is through and then in a quiet and gentle tone of voice say "I am sorry, sir, I did not intentionally make the mistake." That is all you need to say. Say it like a gentleman or like the gentleman you are and let the passenger think it over. Not another word from you. This method will win occurrences that if handled differently result in wordy battles; make you feel miserable the rest of the day, hate your job; and make the passenger condemn our service to his friends.

STYLES AND TYPES

All kinds and types of people patronize your car. Complete service demands that you please all of them. This includes the man who has just come from a quarrel with his wife and who would like nothing better than to take his revenge out on you. Or, it may be the lady passenger who has just missed a bargain sale because the car she came on was not on time. It may be a bumped corn, dyspepsia, indigestion, stomach ache, or just natural cussedness or disagreeableness. It does not make any difference to you

Typical Advertisements in Daily Papers

Many Thanks

WE have received letters praising trainmen for courtesy and consideration of passengers' comfort, convenience and welfare. Many cases of kindness to children and elderly people have been mentioned.

Such letters help the public, the employees and the company.

We invite the public to write us about any feature of the work of our trainmen or of our service which they consider worthy of mention. We will see that every such letter is placed before the employee to whom the credit is due and that it is entered upon his record in the company's offices.

We invite you also to report any lack of courtesy or inefficiency. We investigate every complaint promptly and carefully, and take such action as the facts warrant.

Beaver Valley Traction Co.

All Cars Have Controllers.

All tempers should have. If either are missing from our cars or employees won't you give us the benefit of your knowledge? We in turn promise to improve the condition.

Beaver Valley Traction Co.

Your Point of View

OUR car riders here can be assured that this organization will consider each ride sold as much from the rider's viewpoint as from our own.

The cordial relations existing between this company and its thousands of patrons have been strengthened by always trying to put ourselves in the car rider's place.

Do not hesitate to write or phone us upon service matters. We are in your employ.

Beaver Valley
Traction Company

Street Car Conductors—Service and You:—

HUMAN, real, a living, breathing representation of the handiwork of God—that is the Street Car Conductor. He has his temperament, emotions, temptations, likes and dislikes, affections, loved ones, hopes, aspirations, trials and tribulations just the same as you and I.

We take the best of those applying for this position and through teaching and constant supervision strive to make of them such men as will truly represent these companies before you—the public, our patrons.

Just as all humanity is liable to err, misjudge, fail or weaken, this man of service on the cars is not immune. He cannot be and be human. We pride ourselves though that the street car conductor errs less often under a ten times greater strain than those in other similar callings.

Bear in mind the street car conductor daily has a constantly changing patronage. It becomes a finished salesman's task to meet the moods, supply the information, sell the ride, make the collection and satisfactorily close the transaction by delivering each patron safely to destination on time and without undue inconvenience.

We spend much time training the men serving you on the lines. To always keep employed and to employ those who are or will become most proficient is a task. That perfect type of supervision does not, nor will it ever, exist in this or any other calling.

We ask you to expect a better service, more thoughtful attention on these lines than you will obtain in any other community, but, please, when one employee fails to meet your standard or expectation of service, do not condemn us all. Recognize the frailties of man and be governed accordingly.

Beaver Valley Traction Co.
Pittsburgh & Beaver Street
Railway Co.

Akron's Buses Were Powerful Influences in Developing Housing Sites

No. 1—Present-day standard White truck mounting Avery body.

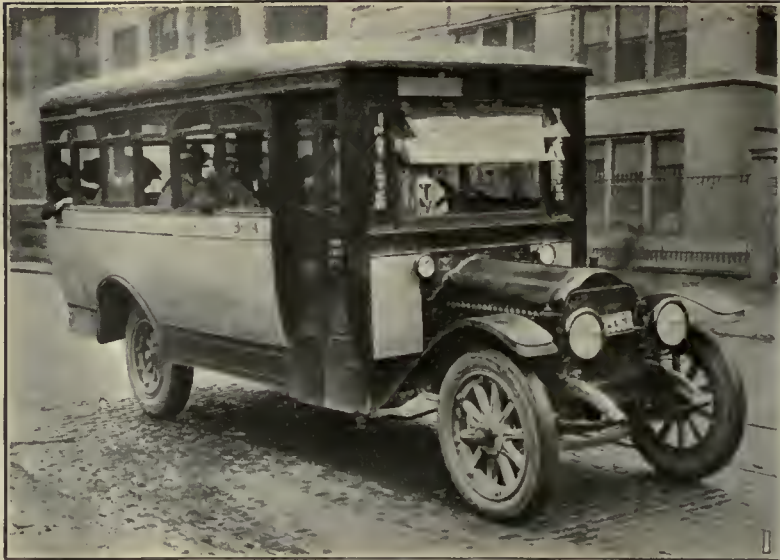
No. 2—Type of original bus put in service in September, 1915.

No. 3—Entrance to Avery type body showing fare box and location.

No. 4—Experimental six-wheel type vehicle, with 70-hp., 6-cylinder, $4\frac{3}{4} \times 5\frac{1}{2}$ Wisconsin motor. This vehicle seats forty-four passengers.

No. 5—Interior of Avery body fitted with cross seats.

No. 6—First type of single-deck bus with open body.



Akron's Motor Bus Route

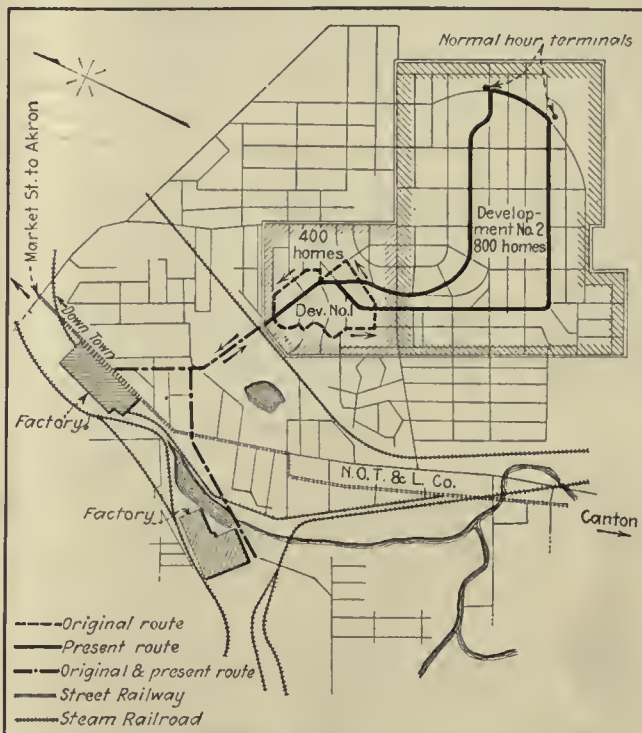
A Non-Competitive Route, Operated in Connection with a Housing Development, Proves that the Motor Bus Can Be Operated Successfully as an Auxiliary When Proper Service Is Given and Reasonable Fares Are Charged
—Full Statistics Are Given

THERE is in Akron, Ohio, a bus transportation system that has been in operation several years. This bus line, although operated independently, is an auxiliary to the local street railway system and serves territory not reached by any other transportation service. The line, which in no sense is a competitor of the trolley system, was started by the Goodyear Tire & Rubber Company and is still owned by that corporation, and its purpose is to provide transportation for employees of the Goodyear company between the factory and a tract $2\frac{1}{2}$ miles from the business center of Akron. This property, called Goodyear Heights, had been developed as a residential district in 1913 by the company because of the increasing difficulty which its employees found in obtaining attractive housing facilities in Akron. The first motor bus service was established in September, 1915, because of the need for transportation facilities. It has been the company's policy to make the bus line self-supporting and have sufficient net income after paying operating expenses to meet fixed charges and taxes, including the usual rate of interest on the investment required.

RATES OF FARE

The 3-cent cash fare established when the line was first opened in September, 1915, remained in effect up to December, 1917, when it was changed to 5 cents cash or eight tickets for a quarter. This ticket rate remained in effect until Sept. 1, 1919, when the ticket rate was increased to six tickets for 25 cents, or twenty-eight tickets for a dollar. On Feb. 1, 1920, the sale of twenty-eight tickets for a dollar was discontinued, and on Oct. 1, 1920, the ticket rate of six for a quarter was also discontinued. Since that time the fares have been 5 cents cash without any reduced-rate tickets.

When the bus route opened in September, 1915, the equipment consisted of but one 3-ton capacity



ROUTE OF MOTOR BUS AND CONNECTION WITH LOCAL TRACTION COMPANY AT EAST MARKET STREET

truck, on which was mounted a double-deck body, seating thirty-five people, seventeen on the upper deck and eighteen on the lower deck. The upper deck had cross seats while the lower deck had longitudinal seats. The truck was equipped with solid tires throughout, the rear wheels having double treads. An engine capable of handling 5-ton loads was used, due to the severe grades on the route.

In the spring of 1916 the double-deck bus was supplanted by one of the single-deck type, equipped with pneumatic tires. Among the advantages gained from the use of pneumatic tires was much better riding qualities.

The equipment since made standard consists of a 2-ton chassis equipped with a 5-ton motor, on which is mounted an inclosed body of the Avery type with longitudinal seats, and pneumatic tires 40 in. x 8 in. in the rear and 37 in. x 5 in. in the front.

It was found that the 2-ton chassis was adequate to carry the load and would stand the strain, but that a 5-ton motor was necessary due to the heavy grades over which the bus had to operate. This large size motor also has an advantage in obtaining more rapid acceleration after each stop and the buses are capable of making a speed of 30 to 35 m.p.h. where traffic conditions permit. Typical views of the present types of buses are shown in the accompanying illustrations. On Jan. 1 they comprised twelve of various types. There were three of the type B-64 with cross seats and

TABLE I—OPERATING STATISTICS GOODYEAR HEIGHTS MOTOR BUS LINE

Dec. 1, 1917, to Dec. 31, 1920

	13 Months Dec. 1, 1917, to Dec. 31, 1918	Cal- endar Year, 1919	Cal- endar Year, 1920
Buses in operation at start of period	1	2	8
Buses in operation at the close of period	2	8	12
Average number operated per month	1.1	4.8	11.6
Total miles of bus travel	58,451	198,113	332,787
Total miles of bus travel on routes	57,938	194,151	326,622
Slack travel, to and from garage	513	3,962	6,165
Number of one-way trips	44,567	111,581	187,714
Average one-way trip distance (miles)	1.3	1.74	1.74
Time of one-way trips (minutes)	10.0	11.6	11.6
Number of bus-hours of service	7,428	21,572	36,291
Number of bus-hours available	8,113	33,060	79,344
Per cent of time buses in service	91.5	65.0	46.0
Bus-miles per hour of actual bus service	7.8	9.0	9.0
Total passengers carried	520,879	1,745,189	2,490,856
Number of passengers carried per month	40,068	145,432	207,571
Number of passengers carried per day	1,315	4,848	6,919
Number of passengers carried per bus-hour	69.0	80.9	68.6
Number of passengers carried per trip	11.90	15.60	13.30
Per cent passenger loading (21 seats)	55.7	74.3	3.3
Per cent maximum loading (35 passengers)	34.0	45.0	38.0
Number of passengers carried per bus-mile	8.91	8.80	7.48
Miles operated per gallon of gasoline	5.8	5.3	5.3
Miles operated per gallon of oil	56.7	69.2	102.2

three with longitudinal seats, and four of the type with the side and cross seats. Another type, of which there is but one as yet, is the latest development in passenger carrying buses. It is a six-wheeled chassis, seating forty-four passengers. All wheels are equipped with 40 x 8 pneumatic tires, the four rear wheels being driving, thus increasing traction. The two rear wheels pivot about a trunnion, and thus in going over rough section of road the chassis deflects only one-half as much as a four-wheeled truck. This fact, combined with the use of pneumatic tires, makes the six-wheeled bus an exceptionally easy riding vehicle. This bus was first put into operation in October, 1920, and has been found to be thoroughly practical.

SCHEDULES AND HEADWAY

When the bus route was first opened up the schedule provided a continuous circuit as shown on the map from East Market Street around Development 1. Such routing had its advantages when the traffic was comparatively light, but as the traffic increased this method of routing became less and less desirable because of delays due to interchange of traffic along the road. Numerous schemes of routing were tried in order to

ing the rush hours, but with only half the number of buses in operation. This feature brings out distinctly the economies that can be directly attributed to the flexibility of a motor bus line.

ANALYSIS OF OPERATION

Table I shows operating statistics for the period December, 1917, to December, 1920, inclusive. These figures are actual and show all important data relative to operation. It will be noted that the percentage of available time that the bus equipment operated in 1918 was 91.5 per cent as compared with 65 per cent in 1919 and but 46 per cent in 1920. This figure is specific in that the net earnings of the property are almost directly proportional to this load factor. It shows that care should be exercised in making additions to equipment, where added use of existing equipment might be made to serve the requirements.

Table II shows financial operations for the same period. Tire costs have been included at customers' list prices on the following mileage basis: In 1918—9,000 mi'es; in 1919—10,000 miles; in 1920—11,000 miles.

It will be noted that the revenue as shown is a straight 5-cent cash fare, even though the actual fare collection was somewhat less, and in accordance with the rate schedule shown in the previous paragraph. As this bus line was not operated for profit it is believed that the revenue as shown from a 5-cent cash fare will be of more interest than the actual revenue received.

The study of Table II shows that the lowering of the load factor on the bus decreases the bus mileage per bus and increases the cost per mile of operator's labor. The amount of depreciation is based on a bus life of 100,000 miles, which mileage is covered in three and one-half to four years. The buses at the end of this period of time are carried at a minimum service value of \$1,000, the depreciation being adjusted according to the selling price when the bus is sold.

SCHEDULES MAINTAINED			Headway in Minutes	
From	Date	To	Normal Hours	Rush Hours
September, 1915	November, 1918	.....	20	20
November, 1918	January, 1919	.....	20	10
January, 1919	June, 1919	.....	15	8
June, 1919	August, 1919	.....	10	5
August, 1919	January, 1920	.....	10	4
January, 1920	June, 1920	.....	10-12	3
June, 1920	December, 1920	.....	10-12	3½

determine the best method. When the bus routes were extended to take in Development 2, two distinct routes were operated during the rush hours and buses returned over the same routes. During the normal hours of the day when the traffic was light the buses make a circuit as shown in the map through the second development. The same headway is maintained as dur-

TABLE II—INVESTMENT, OPERATING EXPENSE AND REVENUE GOODYEAR HEIGHTS MOTOR BUS LINE

	Actual			Per Bus Mile			Percentages of Total Operating and Fixed Charges		
	Thirteen Months Ended Dec. 31, 1918	Year Ended Dec. 31, 1919	Year Ended Dec. 31, 1920	Thirteen Months Ended Dec. 31, 1918 Cents	Year Ended Dec. 31, 1919 Cents	Year Ended Dec. 31, 1920 Cents	Thirteen Months Ended Dec. 31, 1918	Year Ended Dec. 31, 1919	Year Ended Dec. 31, 1920
Investment:									
At beginning of period.....	\$6,075	\$8,336	\$29,370	.....	.....	.....	.....	.....	.....
Added during year.....	6,425	30,770	47,568	.....	.....	.....	.....	.....	.....
Total at end of year.....	\$12,500	\$39,106	\$76,938	.....	.....	.....	.....	.....	.....
Buses sold during year.....	.....	.....	8,572	.....	.....	.....	.....	.....	.....
Depreciation charged to operation.....	4,164	9,736	18,721	.....	.....	.....	.....	.....	.....
Depreciated investment in buses at end of year	\$8,336	\$29,370	\$49,645	.....	.....	.....	.....	.....	.....
Operating expenses:									
Gasoline.....	\$2,570	\$9,745	\$16,199	4.39	4.92	4.87	13.10	13.79	13.12
Lubricating oils.....	562	3,036	3,080	0.96	1.53	0.93	2.85	4.28	2.52
Tires—customer's list prices.....	3,168	12,820	16,972	5.42	6.47	5.10	16.20	18.08	13.75
Operator's wages.....	4,203	15,559	33,973	7.19	7.85	10.21	21.50	22.00	27.48
Operation—sub-total.....	\$10,503	\$41,160	\$70,224	17.96	20.77	21.11	53.65	58.15	56.87
Maintenance—labor and material.....	\$2,402	\$10,230	\$14,454	4.11	5.17	4.34	12.27	14.47	11.70
Sundry expense, supervision, minor adjustments, washing and cleaning, non-productive stores' expense and administrative overhead.....	1,222	5,227	9,386	2.09	2.64	2.82	6.25	7.39	7.59
Miscellaneous expense.....	195	292	788	0.33	0.14	0.24	0.98	0.39	0.65
Maintenance—sub-total.....	\$3,819	\$15,749	\$24,628	6.53	7.95	7.40	19.50	22.25	19.94
Insurance (public and passenger liability).....	\$438	\$1,813	\$4,363	0.75	0.91	1.31	2.24	2.54	3.52
Garage rental—\$10 per bus per month.....	140	580	1,394	0.24	0.29	0.42	0.71	0.81	1.13
Depreciation.....	4,164	9,736	18,721	7.13	4.92	5.62	21.30	13.79	15.15
Sub-total.....	\$4,742	\$12,129	\$24,478	8.12	6.12	7.35	24.25	17.14	19.80
Total operating expenses.....	\$19,064	\$69,038	\$119,330	32.61	34.84	35.86	97.40	97.54	96.61
License tags and 6 per cent interest on investment	506	1,735	\$4,193	0.87	0.87	1.26	2.60	2.46	3.39
Total—operation and fixed charges.....	\$19,570	\$70,773	\$123,523	33.48	35.71	37.12	100.00	100.00	100.00
Operating revenue based on 5 cents cash fare.....	26,044	87,259	124,543	44.56	44.04	37.42	133.00	123.10	100.80
Net income on above basis.....	\$6,474	\$16,486	\$1,020	11.08	8.33	0.30	33.00	23.10	0.8
Net income per passenger carried, cents.....	1.24	0.94	0.04	.....	.....	.....	.....	.....	.....
Cost per passenger carried, cents.....	3.76	4.06	4.76	.....	.....	.....	.....	.....	.....
Net income in per cent per year of average investment.....	51.8	42.2	1.49	.....	.....	.....	.....	.....	.....

It will be noted that the insurance item covers both passenger and public liability. As this item has rapidly become a burden it is questionable whether or not it is advisable to carry such insurance or assume the risk for the operators' account, as is done by other public service corporations.

More Open Cars Converted for One-Man Operation

Large Double-Truck One-Man Cars with Removable Sash Are Made from Fourteen-Bench Open Cars by the Eastern Massachusetts Street Railway

THE Eastern Massachusetts Street Railway has recently completed the reconstruction of thirty-seven former fourteen-bench double-truck open cars for use as one-man cars.

The accompanying illustrations show the original old-style open car body and its transition into a closed one-man car. An interesting comparison is furnished in one photograph between this reconstructed car and one of the standard Birney types of safety car. The car as reconstructed measures 41 ft. over all.

The first step in reconstruction was the removal of practically all equipment, including controllers, air brakes, electrical equipment, seats, running boards and old lighting fixtures. At the right-hand corners the longitudinal body sills were cut away to provide for the new door openings and the vestibule was reinforced with steel castings. The body posts on each side of the car were cut so as to allow the installation of two 2-in. x 8-in. longitudinal trussplanks on each side of the car.

Instead of the usual folding step, these cars were rebuilt with a pair of stationary steps of good width. This was accomplished by cutting quite deeply into the vestibule. Sets of folding doors were provided which are operated by pneumatic door engines, the width of the door opening being 42 in.

These reconstructed cars have a seating capacity of

forty-four, with nine cross seats on each side of the center aisle and two 36-in. longitudinal seats at each end of the car. New cross-seat mechanisms were purchased and wooden seats and seat backs were manufactured in the company's shop, utilizing the old open-car seats. These cross seats are 31 in. in width and spaced 30 in. back to back. The width of the center aisle is 24 in. Grab handles are provided.

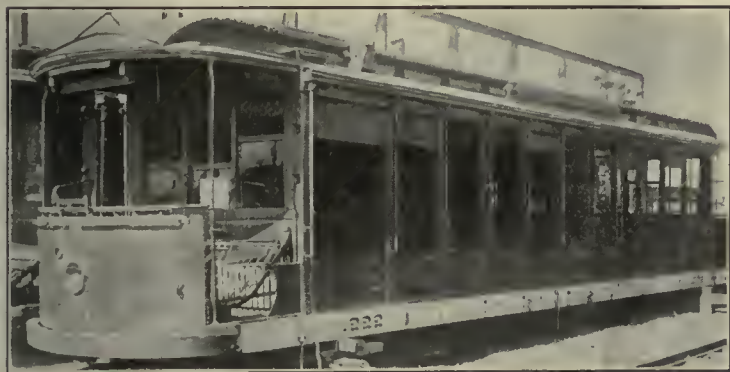
These cars are equipped with sixteen Consolidated cross-seat type heaters which were transferred from obsolete passenger cars. Interior illumination is provided by means of eighteen 23-watt incandescent lamps arranged in two rows along the clearstory.

One of the features of the reconstructed car is the use of portable steel sash, which may be completely removed during the summer if desired. This allows the car to do service practically as an open car. In years past, when this company regularly operated open cars on its lines in summer, it enjoyed quite a fair amount of purely pleasure-riding traffic, as it reaches many popular beaches, lakes and parks and operates through stretches of beautiful country. It is hoped that by making the new cars comfortable and giving them some of the advantages of open cars some extra summer traffic may be developed.

The signal system consists of twenty-four push buttons installed on the body posts between the windows. The Faraday electric line voltage buzzer system is used.

The original air-brake equipment and most of the original electric equipment of the cars were utilized, being replaced after a thorough overhauling.

The arrangement of the operating equipment, including the Johnson fare box, is shown by the accompanying photograph. The fare box is placed close to the dash and almost in the center, where it is most easily reached and watched by the operator but is well out of the way of passengers leaving the car. It is expected that incoming and outgoing passengers will naturally keep to the right.



AT TOP, LEFT, OPEN CAR BODY BEFORE RECONSTRUCTION. AT BOTTOM, LEFT, INTERIOR VIEW OF CONVERTED CAR. AT RIGHT, OPERATING END OF REMODELED CAR PHOTOGRAPHED DURING RECONSTRUCTION

The requirements of the Massachusetts Department of Public Utilities have been met by the installation of a safety device, accessible to passengers, which permits of any one shutting off the power, applying the air brakes and unlocking the pneumatic doors at both ends by simply pulling a conductor's valve. This device is described in more detail and the order relating to it is given in an article on page 1175 of this issue.

These reconstructed cars weigh approximately 40,000 lb., completely equipped, and the first few cost approximately \$3,000 each. It is believed the cost will be materially less when computed on the entire lot. The work of reconstruction was planned and supervised by W. C. Bolt, superintendent of rolling-stock and shops, and was accomplished in part by the Laconia Car Company, Laconia, N. H., and partly in the railway's shops.

The Eastern Massachusetts Street Railway has already converted into one-man cars a large number of

improvements that are to be made in the rest of the boiler plant cannot be determined until the oil-burning equipment has been fully tested.

Manufacturer Pays for Trolley Extension

Earnings of Line Are Guaranteed for Five-Year Period—Preferred Stock Given in Exchange for Cost of Construction of the Line

AN UNUSUAL contract for a line extension was entered into in September, 1919, between the Madison (Wis.) Railway and Oscar Mayer & Company, who had built a new packing house a short distance outside of the city. The length of the extension involved was 4,150 ft. and the actual cost of construction was \$43,000. Negotiations between the packers and the company resulted in a contract, because of the inability of the company to finance the extension or to see how the line would be self-supporting within five years, and this contract provided that the packer should buy at par preferred stock of an amount equal to the cost of the extension.

The packer deposited in advance in a local bank \$30,000, which was drawn upon for the construction work. It was agreed that if the cost of the work exceeded \$30,000, the packer was to purchase additional preferred stock to cover that cost. The contract provides that no dividends will be paid for the first five years, but after that they shall become accumulative. The packer guarantees to pay the cost of operation of the extension for the first five years. A minimum service of three hours per day is provided, for which he must pay the company \$10 per day. For additional service of the first car in excess of three hours there is a payment of \$3 an hour or fraction thereof, with time figured from the time the car leaves the carhouse until it returns. If additional cars are required, a charge of \$5 for the first additional car for the first hour, \$4 for the second hour and \$3 for the third hour, or fraction thereof, is made. For the second and each additional car, a guarantee of \$10 per day minimum is made. The hours during which service may be requested are limited to those between 6 a.m. and 9 p.m., with Sundays and holidays excepted altogether.

The packer receives a credit of 5 cents per day per employee in his plant against these guaranteed charges. This credit is given on a monthly basis, but in no case is the credit to be in excess of the amount guaranteed. In other words, in no event does the railway pay the packer any money under this credit provision. The basis of crediting the packer was reached in a way that was intended to eliminate the expense of keeping accounts. The company estimated that one-half of the employees of the packer, on the average, would ride out and back each day. Consequently, 5 cents apiece for all employees per day was taken as the average business that might be expected. If, after five years, the packer should employ less than twenty-five people for a period of one year or more, or go entirely out of business, the company has the right to discontinue service and take up the track.

The extension was built with 73-lb. rail laid on 6-in. x 8-in. x 7-ft. cedar ties on a concrete base and with brick paving. It was made at the end of an existing line, so that service of one car is extended out to the packer's plant in the morning and again in the evening rush hour.

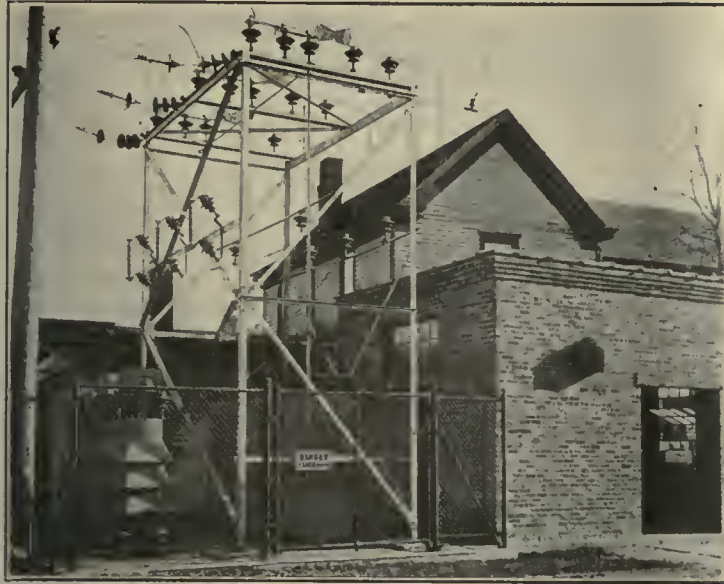


REMODELED CAR WITH BIRNEY CAR AT REAR

its double-truck box cars of the two-man type, has 250 standard one-man cars in service and has now completed the conversion of thirty-seven former open cars. The trustees have clearly indicated to the public they serve, and to the public officials, that the financial plight of the road is such that it is a case of one-man cars or no cars at all. When their program is complete, and they have already reached 90 per cent one-man operation, there will be only about fifteen two-man cars in operation, out of a total of approximately 600 operating cars. They are now operating one line of double-truck one-man cars into the heart of Boston.

Havana Increases Power Equipment

IN MAY, 1920, the Havana Electric Railway & Light Company made a contract with the Westinghouse Electric International Company to furnish two 25,000-kw. turbine-generating units with all auxiliaries. One of these machines is to be shipped about Aug. 1, this year, and the other eight months later. The first unit is to be installed in the present power plant alongside of the existing 12,500-kw. units. The second unit will take the place of one of these 12,500-kw. machines. With this plan the capacity of the present plant will be doubled. The existing boilers, when provided with new high-capacity furnaces and economizers, will be sufficient for the enlarged generating capacity. Except for the receipt of the necessary pipe, valves and fittings, the equipment for eight additional boilers and furnaces for burning Mexican crude petroleum is complete. Any



TWO VIEWS OF THE 500-KW. SUBSTATION AT SELLERSBURG, IND., WHICH IS TYPICAL OF THE CONSTRUCTION USED AT ALL RAILWAY SUBSTATIONS

Traction Power Obtained at Lower Cost

Interstate Public Service Company on Indianapolis-Louisville Line, Made
Up of Three Once Independent Properties, Inaugurates \$40,000
Annual Saving by Rehabilitation of Its Power System—
One Automatic Substation Included in Program

THE power supply system of the Interstate Public Service Company of Indianapolis has just been improved.* The work included the shutting down of one direct-current generating station and one 25-cycle generating station, the building of 54.6 miles of new 33,000-volt transmission line and the rebuilding of 58.25 miles of existing transmission lines for higher voltage, the making of arrangements for purchasing power at Louisville and Indianapolis, the junking of the rotary converter and other substation equipment at six substations, the purchase of new converters and switching equipment for ten substations and the erection of six new substation buildings.

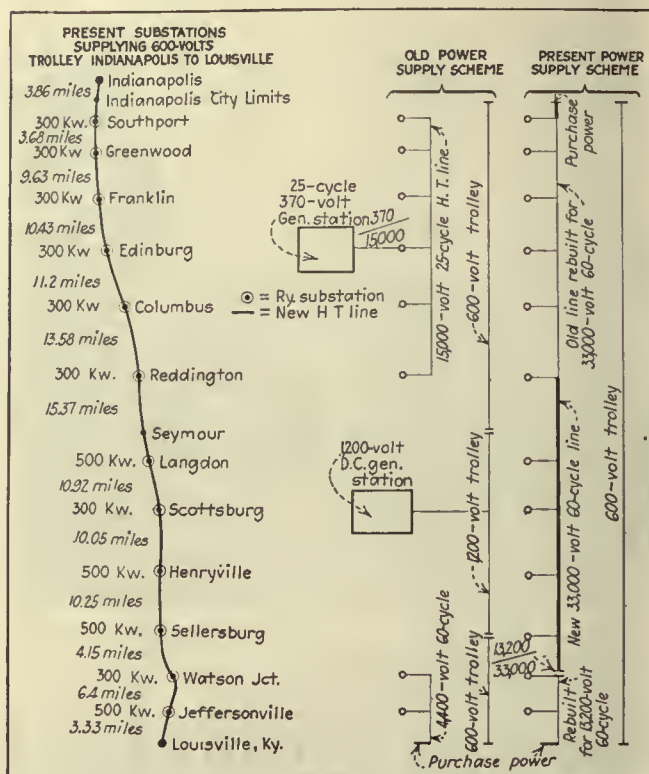
Originally, when the line between Indianapolis and Louisville was owned and operated by three different companies, the 58 miles from Indianapolis to Seymour was operated with 600-volt trolley current supplied by a 25-cycle, 370-volt generating station located at Edinburg, Ind., and distributed over a 15,000-volt transmission line extending to Southport on the north and to Reddington on the south and connecting with six rotary-converter substations. The 41-mile section of the line from Seymour to Sellersburg was operated at 1,200 volts trolley potential supplied by a reciprocating engine, direct-current generating plant located at Scottsburg, each engine being direct-connected to two 600-volt generators connected in series. Feeders extended approximately 20 miles each way from this power house. The 14-mile section of the line between Sellersburg and Louisville was operated with a 600-volt trolley current supplied from two converter substations, for which power was purchased from the Louisville Gas & Electric

Company and transmitted to it at 4,400 volts. These two substations were operated at 60 cycles frequency and no change in them was required except for the transformers, for which new ones were substituted to receive energy at 13,200 volts instead of 4,400 volts.

LIGHTING AND INDUSTRIAL POWER LOAD INVOLVED

An important consideration involved in the rehabilitation of the power-supply system for the interurban line was the fact that the Interstate Public Service Company also serves the towns of Greenwood, Franklin, Columbus and Seymour with current for lighting and power purposes. This practically necessitated 60-cycle energy, and rather than resort to the use of frequency changers to supply the lighting current for these towns, and because it had been determined that a good economy could be effected through the purchase of power at Indianapolis and Louisville which was of 60-cycle frequency, it was decided to substitute 60-cycle rotary converters for the 25-cycle equipment formerly in use. A 33,000-volt transmission line connecting all of the railway substations and the lighting substation was therefore built and arrangements made with the Merchants' Heat & Light Company at Indianapolis to supply the major portion of the energy required. The existing transmission line, extending from Southport to Reddington, was then reconstructed and spaced for 33,000-volt operation, and extended north about 4 miles to connect with the Merchants' Heat & Light Company transmission system at the city limits of Indianapolis. A new 33,000-volt line was also built from Reddington south to Watson Junction, where it was tied in with the Louisville Gas & Electric Company system by installing 33,000/13,200-volt transformers, the 4,400-volt line from

*See articles in issue for June 4, page 1027, for other improvements on this property.



DIAGRAMS SHOWING PRESENT LOCATION AND SPACING OF SUBSTATIONS AND LAYOUT OF THE OLD AND THE PRESENT POWER SUPPLY SCHEMES

Louisville to Watson Junction having been changed over for 13,200-volt service.

The 25-cycle substation equipments at Southport, Greenwood, Franklin, Edinburg, Columbus and Reddington were replaced with 300-kw., 60-cycle units, and at Edinburg and Columbus the installation included a new substation building. To serve that section of the line formerly operated at 1,200 volts, the old direct-current power house was replaced by four 500-kw., 60-cycle, six-phase, 600-volt substations located at Langdon, Scottsburg, Henryville and Sellersburg. Except at Scottsburg, where the converters and other substation equipment were installed in the shop, new buildings were erected. In all the stations where practical the

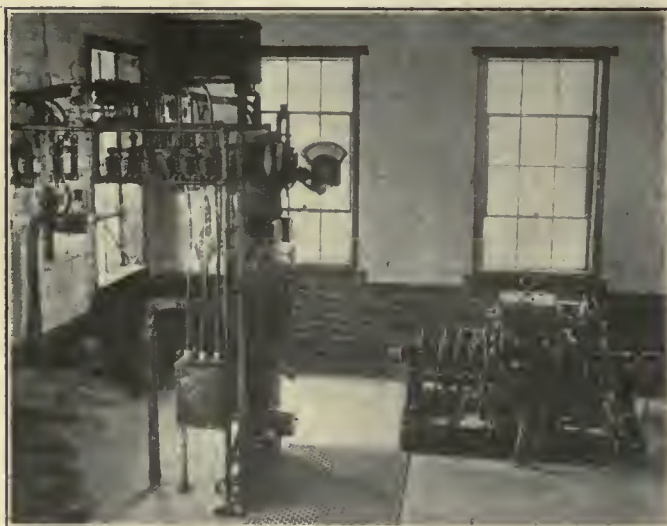
transformer station for the lighting and power load was combined with the railway substation and outdoor type transformers and high-tension switching equipment were used for both.

AUTOMATIC SUBSTATION LOCATED AT LANGDON

All of the railway substations are manually operated except the one located at Langdon, which is equipped with automatic control. Langdon is the only point where a substation is located at which the company does not have either a station agent or shop man, who would have to be on the payroll anyway. Between Seymour and Sellersburg, where there had been no substations previously, it was possible to locate all of the new substations except Langdon at points where they could be operated by regular employees of the company, so that the saving of labor derived from automatic operation was a factor only at Langdon. It is tentatively planned to install another 500-kw. rotary converter substation at Seymour. Beyond that, future requirements will be secured by installing additional converters in the existing substations, according to present plans.

An accompanying sketch shows the present substation spacing and pictures schematically the old and the new power supply system, from which the changes made can be seen at a glance. Pictures of several of the substations are also reproduced and these are typical of the construction followed throughout the system. The converter is housed in a small square brick building and the transformers and high-tension buses and switches, lightning arresters, etc., are installed outside the building.

A saving in the cost of power of between \$12,000 and \$15,000 annually was estimated to result from the shutting down of the Scottsburg direct-current power house, and \$25,000 additional by closing down the Edinburg alternating-current power house. A total saving of approximately \$40,000 a year has thus been made by shutting down the two obsolete power plants and arranging for the purchase of energy. No accurate comparison of the energy consumption per car-mile operated under the improved power and distribution system as against the old system is available owing to the incomplete sets of measuring instruments in use in the old installations.



TYPICAL INSTALLATION OF CONVERTER, SWITCHING APPARATUS, ETC. THIS PARTICULAR PICTURE IS OF THE 300-KW. SUBSTATION AT EDINBURG, IND.



TYPICAL COMBINATION RAILWAY AND LIGHTING SUBSTATION. THIS PICTURE SHOWS THE COLUMBUS SUBSTATION ADJACENT TO CARHOUSE

What Traffic Observations Are Needed

The Information Obtainable from These Observations Is Well Worth the Required Expenditure of Energy
—Full Use Must Be Made of All Data Collected

BY J. KAPPEYNE

Railway Engineer, Syracuse

THE necessity of furnishing the best possible service consistent with the lowest possible cost is forcibly being impressed upon nearly every executive in the electric railway field today.

Good railway service requires quick response to the demand for service. Low costs, particularly during periods of high wages, are reflected by high average operating speed.

Schedules indicate the amount and the speed of the service the company purposes to furnish. It becomes, therefore, necessary that the schedules be constantly adjusted with every important fluctuation in the demand for service and that they be frequently revised whenever there exists undue interference with the established speed.

Unfortunately too many schedules are still in effect which were made as applying to conditions which no longer control. Frequently no effective means are taken to keep the traffic department properly informed of important changes affecting the demand for service or the operating speed. Often the old-fashioned method of having inspectors report such changes in conditions as they may have been able to observe gives the only information upon which a revision of schedules is based.

It is essential, in order to keep service and its cost abreast of the times, that systematic traffic observations be made at regular intervals. By properly grouping and analyzing the data collected from a so-called "on and off" traffic survey the following information may be readily obtained:

1. The number of passenger-miles, from which may be calculated the average length of ride per passenger.

2. The traffic density, or the average number of passengers per car, which enables the selection of the proper location for collecting multiple fares, and for turning switchback service.

3. The segregation of the profitable from the unprofitable lines, which is determined by the combination of length of passenger haul with traffic density.

4. The passenger traffic flow, which represents demand for service. This, when compared with the number of cars operated, or more correctly the passenger spaces, gives a relative picture of the quality of the service furnished.

5. The maximum load carried, which is the basis for determining the amount of service to be furnished.

6. The diversity factor of demand for service, used in establishing a reasonable standard for service.

7. The length of standing passenger haul, which is a factor to be considered in determining the adequacy of the service furnished.

8. The number and frequency of stops made, generally warranting a revision of car-stop locations.

9. The running time between time points, allowing the checking of schedule time against actual time, and often forcibly demonstrating the necessity of establishing different schedule speeds for various periods of the day.

10. The time when and the location where the lowest car speed is found. This usually indicates maximum interference by other traffic. Where feasible, conditions unduly retarding traffic should be remedied.

11. The greatest number of cars passing a certain point per unit of time, giving an indication as to track capacity and often demonstrating the necessity of re-routing certain cars on parallel streets.

12. The daily passenger load curve, which shows whether the traffic on each end of through lines is properly balanced.

13. The irregularity of headway, obtained by comparing actual headway with scheduled headway. This furnishes a relative measure of the efficiency of the traffic inspectors.

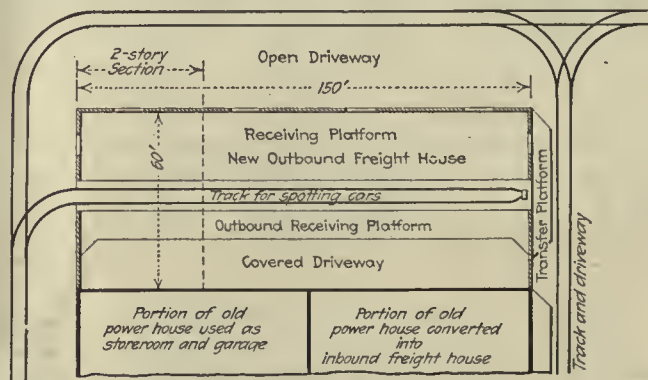
14. The location of points of heavy loading and of frequent interchange of traffic, indicating where inspectors should be stationed in order to give assistance to the greatest number of the riding public.

Railway officials are not always fully alive to all of the information obtainable from such a traffic survey. Frequently a survey is made with one particular object in view and the analysis of the other obtainable results is neglected.

If full use is not made of all the data collected from traffic observations, an opportunity may be lost to improve the service or to reduce the cost thereof.

New Terre Haute, Indianapolis & Eastern Freight House

THE Terre Haute (Ind.) Division of the Terre Haute, Indianapolis & Eastern Traction Company has recently completed a new outbound freight house for the convenience of Terre Haute shippers. The building is constructed of brick and is 150 ft. long by 50 ft. wide, with a two-story section along the front to provide office quarters on the second floor. An idea of the floor



SKETCH SHOWING FLOOR PLAN AND TRACK FACILITIES FOR NEW TERRE HAUTE FREIGHT HOUSE

plan of the building, track layout to serve it, etc., may be gained from the accompanying sketch.

Freight is received for shipment either from the outside driveway, clearly shown in the accompanying picture, or in case of bad weather or congestion teams can also deliver their loads by way of a covered driveway on the opposite side of the building. The handling of shipments is minimized by placing the names of different shipping points over the four receiving doors along the open driveway. The only trucking required then is to remove the merchandise from these doorways across the platform to the cars, which are spotted on a track extending through the center of the building.

There is a platform between the track and the driveway on either side of the track. The platform floors in the new building are made of concrete. The work of billing merchandise is facilitated by the installation of automatic springless weighing scales.

At the rear of the building a platform has been provided for convenience in transferring shipments from the inbound freight house to the outbound house. The inbound freight house is what formerly was the boiler room of a large power house which stands adjacent to the present new outbound freight house.

The Street Railway "Auto-Superintendent"

A Talk to Railway Managers About the Use of Automobiles by Railway Officials and the Effects of This Practice

(Contributed by the Manager of a Western Property)

HAVE your superintendent and inspectors acquired the automobile habit? If they have not your company is to be congratulated, for, once this habit is acquired, you lose the service of a once efficient official.

To learn if your superintendents and inspectors have formed the habit, you need not follow them about the city. These facts will come to you in the form of complaints from the few street car riders that are left to support street railways. These complaints will cover discourteous treatment by motormen and conductors, failure to stop for passengers, objectionable smoking and spitting in cars, dirty cars, employees smoking on duty, accidents caused by motormen entertaining friends on the front platform, failure properly to safeguard the infirm, the very old and the very young passengers and a good many other complaints of a quite similar nature.

You will also hear from the city officials. Your right-of-way pavement is being neglected, unpaved portions of the track are not kept ballasted, sprinkling of right-of-way is indifferently done, bad low joints are in the track and the traffic ordinances are continuously being violated by motormen.

You will also hear from the bondholders and you will explain to them that the automobile travel is cutting into your gross revenue. So it is, but much of the fault lies with the official who has formed the automobile habit. It becomes too slow for him to ride any longer in the street cars, yet he expects other people to do so. It is pleasant indeed to a motorman or conductor, and to the passengers, on a slow-going street car, to have the street railway superintendent frisk past the street car in his automobile, at a high rate of speed, and "give his dust" to the people in the street car. Not a good example to set as a business getter. It makes a passenger feel that "the world owes him an automobile." He might even feel that his money is helping the corporation buy automobiles for its officials and that street railway fares are entirely too high. Office work is real irksome to the joy-riding official. He neglects this entirely or puts it off for a stormy day when automobile riding becomes unpleasant.

The writer believes that the day is not far distant when owners of public utilities will check up on their automobile expense and eliminate some of the joy riders. They can be found on the payrolls of electric, gas and water companies as well as the street railway company.

Letters to the Editors

"Get the Young Engineer While the Getting Is Good"

To the Editors:

In reading the June 4 issue of the *ELECTRIC RAILWAY JOURNAL* I found the following article: "Get the Young Engineer While the Getting Is Good." This article takes up the slowness of electric railways in absorbing young engineers into their organization.

I have just been graduated from the University of ——— with the degree of bachelor of science in electrical engineering. I desire very much to attach myself to some electric railway company and "make good" with that company.

Since you are in touch with the various electric railways of the country, perhaps you know of some opening for a young engineer. If so, will you please let me know to whom I should apply.

1921 GRADUATE.

[If any one is looking for a young man like this, his name and address may be had on request.—EDITORS.]

Single Entrance Satisfactory in Terre Haute

TERRE HAUTE DIVISION, TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION COMPANY

TERRE HAUTE, IND., June 15, 1921.

To the Editors:

It would seem to me that the very excellent letter of Mr. Gove in your issue of June 11 would serve to close the discussion of safety car design standards that has been had in the *ELECTRIC RAILWAY JOURNAL* during the past few months, and which I have followed with keen interest.

Perhaps you would not object to granting the privilege of your columns for just a word of approval of those who have urged sticking to Birney car standards.

Some months ago the writer made the statement that we attributed a large measure of our success in the operation of Birney cars to the fact that we had adhered religiously to the standards set by the designer and builder, taking on only such changes on our various and progressive purchases as had been incorporated by the designer and builder for the sake of improvement over the original design. These have involved only an improved truck design and a change in the operator's seat. The statement referred to would be just as true today.

Perhaps the operation of safety cars very nearly six million car-miles in the last two and one-half years and the operation of 100 per cent safety car service during the last six months entitle us to express an opinion. At any rate we have not seen any of the changes in design of the Birney car that, to our mind, improve its serviceability or its adaptability.

We have operated the standard car with every varying degree of density of traffic from 15 cents to 54 cents per revenue car-mile (daily average of 5-cent fare) and we are still "for" it.

I think that some of us tend to the feeling that it is up to us to do not only our own thinking but that

of the public as well. The human race adapts itself to conditions and does not willingly change those conditions as long as they are comfortable and reasonable. The Liberian negro, accustomed to carrying his load on his head, still continued to do so even after the white man had furnished him a wheelbarrow.

I have seen in one of our large cities the bulk of the short-haul passenger traffic handled by motor buses of a seating capacity of twelve to twenty, each of these buses with only one door for both loading and unloading. I doubt if there is a demand on the part of the bus passengers or a serious thought on the part of the bus owners themselves to alter the design of these buses so as to facilitate loading, unloading or provide more standing room.

It seems that many are still of the opinion that the safety car is a small town car and that its design, to make it adaptable to large cities (which after all are in the main simply groups of smaller cities) must be modified or changed. Yet our experience convinces us that a property earning anywhere around 30 cents per car-mile (on the basis of a 5-cent fare) at one-minute headway has a fertile field for the safety car of standard Birney design.

E. M. WALKER.

Railways Should Be Protected Against Unjust Competition

THE SOUTHWEST MISSOURI RAILROAD

WEBB CITY, Mo., June 11, 1921.

To the Editors:

When hard surfaced roads are built parallel to steam or interurban lines and are thrown open free to the use of the heavy truck, whose driver many times has little regard for other travel, there is little benefit to the farmer, manufacturer, business man, pleasure rider or consumer. The construction of these roads places an additional burden in the way of taxes, serves only a small portion of the country and allows certain classes to pursue their occupation without paying anything toward road building or upkeep. Eventually such road construction makes the consumer pay more for what he buys and the producer realize less on what he has to sell.

Not many of us ever stop to figure out who it is that is furnishing the money for building good roads, nor what the motive may be when certain routes are selected. But when the acts of a few men directly or indirectly cripple our large enterprises by taking away the cream of their business, the community at large must pay the bill. Let us not fool ourselves nor be fooled by the silver tongued orators into the belief that business can be successfully carried on without invested capital. It makes no difference whether this money is furnished by the federal, state or county authorities or by private subscriptions. Those using these roads for their own business should pay liberally toward the upkeep. The financial standing of a well-managed railroad and public utility is as vital to the life and development of a community as its financial and commercial institutions and should be protected against unfair attacks or unjust competition, so that its customers may receive full benefit derived from such enterprises.

Many of the good old American type of citizens, who believe in equal rights and justice to all, have been slumbering on their rights for years, knowing they were surrounded by Nature's gifts in profusion.

They have expected both the commercial and civic interests to develop, while they sleep on until the country has reached a point where it needs the advice of wise and conservative men. Extravagance, shiftlessness and disregard for the rights of others were some of the lessons learned from the world war. Railroads, public utilities, trucks and automobiles, each has its field and all are essential in the development of our commercial interests. Good roads are needed to develop our resources in every section not served by other means of transportation, but we shall be going backward in a commercial way when we allow these roads to be built and used to cripple other enterprises.

E. J. PRATT,
General Manager.

Key Route Starts Bus Operation

THE San Francisco-Oakland Terminal Railways, Oakland, Cal., in May, 1921, opened a new line, using gasoline driven motor buses. This line serves as an extension of the company's rail service and extends



THE KEY ROUTE SUPPLEMENTS ITS RAILWAY SERVICE BY OPERATING A LINE OF MOTOR BUSES

from the Fortieth Street Station up Piedmont Avenue, thence over the so-called old Moraga Road to the town-site of Montclair, a distance of 291 miles. Four buses have been purchased and two are needed to fill the twenty-minute headway that is maintained from 5:40 a.m. to 8:40 p.m.

Special bodies were built by A. Meister & Son, Sacramento, Cal., and have a capacity of eighteen seated passengers. The bodies are mounted on a 2½-ton White truck chassis of standard design and support. Pneumatic tires are used. The original equipment consisted of Firestone cord tires throughout.

The basic rate of fare for a ride on the bus is six cents with free transfers to and from the city line with which it connects, but no free transfers are issued to the suburban line for San Francisco, with which it also connects.

The underlying reasons for putting in buses in preference to rail service are stated as being purely economic.

The company estimates that with an investment of \$26,000 for the four buses, as against one of \$138,000 for rail cars and overhead wires including feeders, the service rendered can handle the traffic to be developed for the time being.

Equipment and Its Maintenance

*Short Descriptions and Details of New Apparatus of Interest
to the Industry. Mechanical and Electrical
Practices of All Departments*

New Cars for San Francisco

Car Bodies with Steel Sides Applied to a Wooden Framework Built in Shops of United Railroads—Trucks and Motors Taken from Cars that Have Become Obsolete

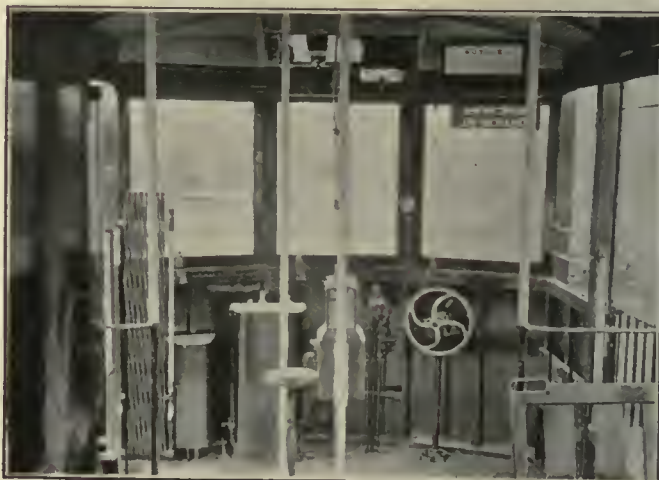
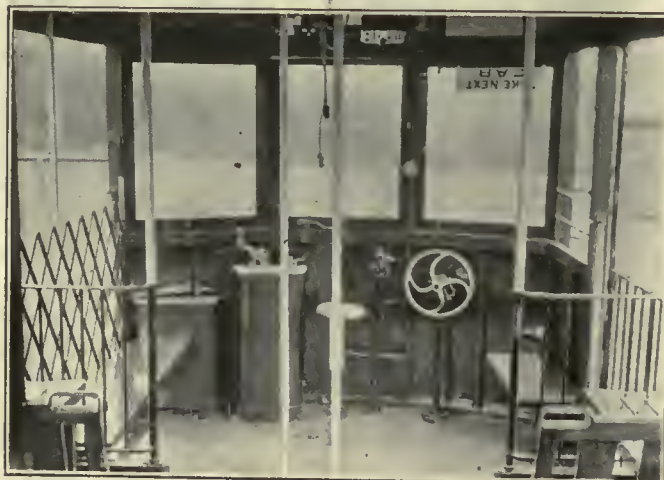
THE United Railroads of San Francisco have been building their own car bodies since 1913 and have been previously equipping them by using trucks and motors from cars that have become obsolete. During 1920 twenty cars were built and eleven of these have now been placed in service, these cars being equipped with new trucks and electrical equipment.

The new cars are of the open-end type, having a closed central portion 15 ft. 6 in. long with an open portion at either end 8 ft. 5 in. long with a platform 7 ft. 4 in. long. This type of car is popular in California as, due to the local climate, passengers can ride in the open section with comfort during the entire year. The closed section of the car has longitudinal seats, while the open one has four cross seats and two short longitudinal seats, seating two passengers each. There are also four upright stanchions on either side of the

car in the inclosed portion. These are made of $\frac{1}{2}$ -in. pipe and extend from the floor to the roof, acting as grab handles, seat supports, roof stiffeners and seat spacers.

The car body consists of a wooden frame with No. 12 gage steel sides. The entire bottom framing and all posts and plates are of Oregon pine. The inside finish of the closed section is of gum and the sash are of teak. No headlining is used in the car. The entire ceiling is painted a light drab and all stanchions white. Due to the severe dips in the track that exist at junctions of track on steep grades and level track it is impossible to use a lower step of less than 15 in. in height. The platforms have a 2-in. ramp and also a 2-in. crown. There is also a 2 $\frac{1}{2}$ -in. ramp from the end sill to the center of the bolster. The bolster used, as shown in an accompanying illustration, is of somewhat unusual construction. The top consists of a straight plate, while the bottom member has very slight offsets and the end angle is a machined steel casting. The fillers consist of two 7-in. channels, as shown.

Accompanying illustrations show the appearance of



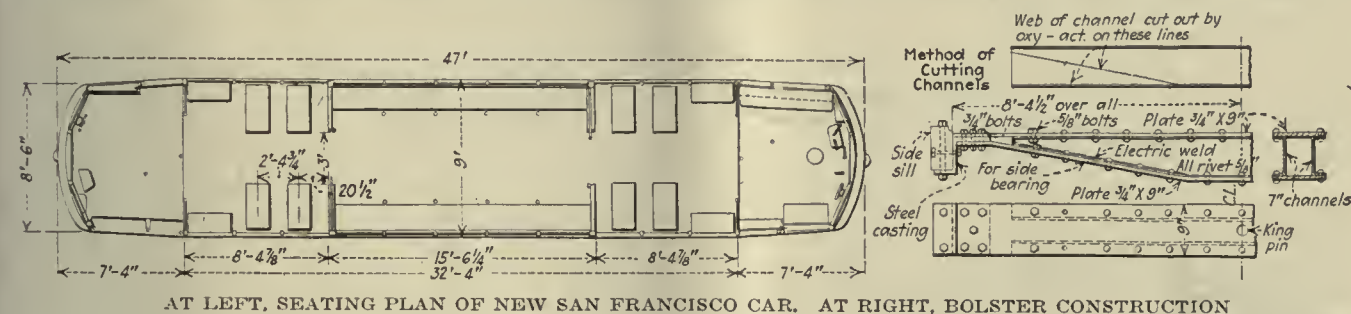
AT TOP, TWO INTERIOR PLATFORM VIEWS; AT BOTTOM, SIDE AND END VIEWS OF THE NEW CAR

the car. The open-end portions are equipped with storm curtains, the three curtains for each side being fastened to one roller, which is entirely under the control of the car crew, so that passengers cannot lower or raise them. When in the down position the curtains are fastened to the outside of the car by hooks and tightened manually.

All lighting wires, auxiliary and trolley wires are carried in wooden ceiling moldings which run straight through the car from end to end, and all switches are located above the motorman's head. The power cables are inclosed in a box in the body section of the car and

accessible to passengers and their use in an emergency shall be posted in a conspicuous place in the car.

The first part of the above order referred to the standard Birney car, and to conform with the requirements of the Department of Public Utilities, as applying to the 250 Birney cars which the Eastern Massachusetts Street Railway now has in regular operation, a standard conductor's valve is being installed, located in the center of one side of the car immediately below the advertising rack molding. This conductor's valve is connected with the emergency control line by means of



AT LEFT, SEATING PLAN OF NEW SAN FRANCISCO CAR. AT RIGHT, BOLSTER CONSTRUCTION

run in duraduct from end sill to controller. Conduit is used for motor leads and resistance wires.

The car seats fifty passengers and weighs 36,000 lb. complete. The trucks with wheels and axles weigh 11,560 lb. and the motors, gears, pinions, etc., 7,760 lb. The car body with all attachments weighs 16,680 lb. The trucks are the Standard 0-40 double-truck type with 4-in. axles and 30-in. wheels. Other equipment details consist of the following: Four GE-247-D 40-hp. motors, two K-28-E controllers, two MA-13 fuse boxes, two MR-13 circuit breakers, two US-15 trolley bases, one DH-10, 10-ft. Westinghouse compressor, one 8-in. brake cylinder, one type E-1 American slack adjuster, one 16 x 45 air reservoir, one Westinghouse type H-1 emergency valve, two conductor's valves, U. R. R. car signs, Johnson fare boxes, Golden Glow headlight.

Safety Devices on Bay State Cars

Ways in Which Eastern Massachusetts Street Railway is Equipping Its One-Man Cars to Conform to the Order of the Department of Public Utilities

By W. C. BOLT

Superintendent of Rolling Stock and Shops, Eastern Massachusetts Street Railway, Chelsea, Mass.

ON NOV. 8, 1920, the Department of Public Utilities of the Commonwealth of Massachusetts entered an order relating to safety devices on street railway cars. One of the requirements of this order called for the installation of additional safety devices on so-called one-man cars. The section of the order follows:

Every street railway car operated by and in charge of one man shall be equipped with either (1) a device so designed and maintained that upon the release of the controller of the car by the operator the motive power will be cut off from the propelling motors of the car and the brakes will be applied, together with a device located in a conspicuous place to the rear of the front platform and vestibule of the car and accessible to passengers by the operation of which a door at the rear of the car will be unfastened so that it can be opened from the inside of the car, or (2) shall be equipped with a device located in a conspicuous place to the rear of the front platform and vestibule of the car and accessible to passengers by the operation of which the motive power will be cut off from the propelling motors, the brakes applied and a door at the rear of the car unfastened so that it can be opened from the inside of the car. Instructions as to the location of said devices

a 3-in. pipe. The operation of this valve by a passenger will apply the emergency brakes, cut off the power from the propelling motors and unlock the rear door, as well as supply sand to the rail. The following sign is being installed adjacent to this conductor's valve instructing passengers in the use of the valve:

EMERGENCY VALVE

In case of accident, PULL CORD to stop car and unlock rear door

The second section of the order relates to cars which are not equipped with the standard safety devices and applies specifically to some 420 double-truck cars which the Eastern Massachusetts Street Railway is operating on the one-man plan at the present time.

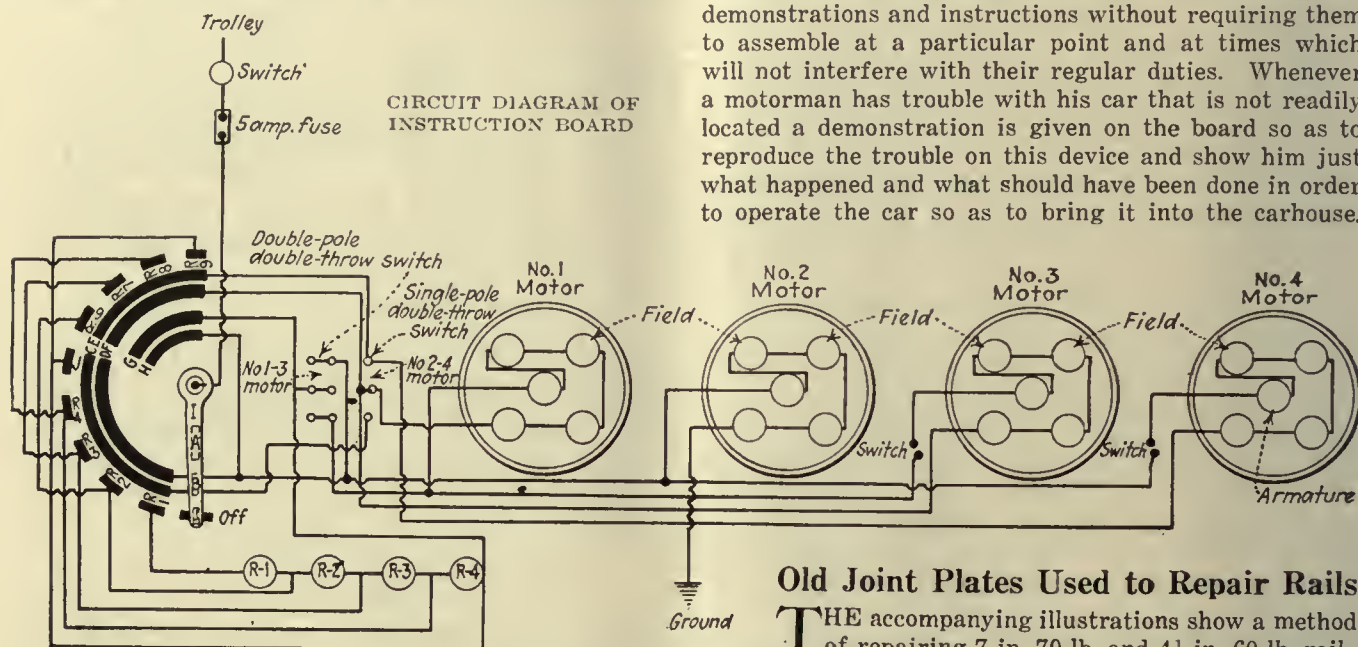
To conform with the order, as applicable to these double-truck, one-man cars, our company made a thorough study of the problem in conjunction with the leading equipment manufacturers, which resulted in the installation of the following equipment: Each car will be equipped with a conductor's valve located in the center, on one side of the car. This conductor's valve is connected with an emergency valve located on the inside of the car, underneath one of the seats, and is also connected with two pneumatic door engines; one on the right-hand door of each vestibule. A separate pipe line operates a small circuit breaker knock-out cylinder and, when application is made, throws the master control switch, thus cutting off the power. On some cars which are not equipped with a master control switch, two small knock-out cylinders are installed, throwing the two circuit breakers. On other cars the knock-out cylinder operates a small control-circuit switch.

To provide sufficient reserve of air in case of emergency, an additional air reservoir is likewise being installed on these cars, thus providing reserve air which is passed directly into the brake cylinder. When the installation is complete, any passenger, in case of accident, by pulling the cord attached to the handle on the conductor's valve, can shut off the power from the propelling motors, apply the brakes to the car and unlock the rear door of the car, thus performing the functions required by the Public Utilities Department. A sign similar to the above is being installed on these cars also.

Portable Instruction Board

Device in Use by the Kentucky Traction & Terminal Company for Instruction of Motormen Has Proved of Great Assistance in Insuring the Proper Operation of Cars and Equipment

THE accompanying illustrations show a portable instruction board designed by E. M. Carr, general shop foreman Kentucky Traction & Terminal Company, for use on its system to instruct motormen in the various operating circuits of cars. The board shown



is for a four-motor equipment, but a similar board can be used for a two-motor equipment if desired. The circuits through the motors and resistors are indicated by lamps. The motor circuits consist of four groups of 23-watt Mazda lamps, each group consisting of five lamps and each group representing a motor. Of the lamps in each group the center lamp represents the armature and the four other lamps the four field coils. Four lamps located at the bottom of the board represent the car resistors. The several steps of the controller are provided by operating the rheostat at the left of the board. By feeding this controller a notch at a time, the



PORTABLE INSTRUCTION BOARD

exact conditions under which the motors successively receive their current are shown.

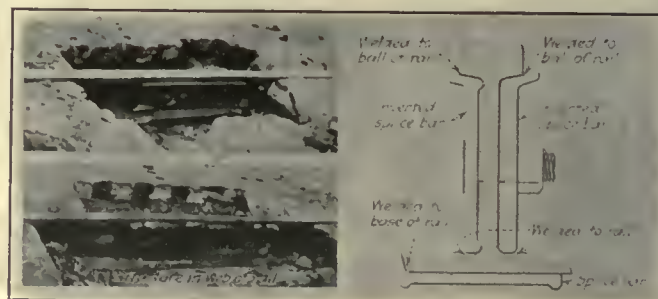
Defects in motors, cables, rheostats, etc., are imitated by unscrewing lamps from the sockets so as to break the circuits and by the use of cut-out switches shown on the board. These cut-out switches are also used to demonstrate how a car which may "have trouble" can be operated. The circuits are arranged so that they can be operated on 500 or 600 volts as available.

As the board is portable it can be taken to the different carhouses on the system and motormen can be given demonstrations and instructions without requiring them to assemble at a particular point and at times which will not interfere with their regular duties. Whenever a motorman has trouble with his car that is not readily located a demonstration is given on the board so as to reproduce the trouble on this device and show him just what happened and what should have been done in order to operate the car so as to bring it into the carhouse.

Old Joint Plates Used to Repair Rails

THE accompanying illustrations show a method of repairing 7-in. 70-lb. and 4½-in. 60-lb. rails used by the Springfield Traction Company, Springfield, Mo. Previous to the use of this method the practice of the company was to cut out the defective sections of rail and replace with sections about 8 ft. long. This method of repair required two sets of joint plates, and in addition the expense for cutting out the section was somewhat high.

The method now used consists of using old continuous joint plates by cutting off the portion that goes



AT TOP, LEFT, JOINT READY FOR WELDING; AT BOTTOM, LEFT, JOINT WITH REPAIRS PARTLY COMPLETED; AT RIGHT, INVERTED SPLICE BAR WELDED RAIL JOINT

underneath the rail but leaving the flange at the other end. These plates are applied to the joints with the wide flange uppermost as indicated in the accompanying illustration. In addition to using one of these joint plates on either side of the T-rail an additional plate is placed underneath the rail joint and all three plates are welded along the edges as indicated. This type of construction has proved extremely satisfactory on a line with two and one-half minute headway.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

\$4,000,000 for Improvements

Mr. Mitten Plowing Money Back Into Property and Increasing the Stockholders' Equity

Approximately \$4,000,000 from earnings will be plowed back into the property of the Philadelphia (Pa.) Rapid Transit Company during 1921 in additions and improvements. According to President T. E. Mitten adequate provision for necessary repairs, renewals and improvements could not be made during the wartime period. Militating against carrying out the work then were the high cost of material, the impossibility of securing sufficient labor and the money shortage due to delay in securing increased fare.

The very extensive program of repaving undertaken by the city requires during this year the rebuilding of more than 90 miles of track construction, or more than double the usual undertaking. Besides there are more than 60 miles of trolley wire renewals, and certain car improvements, representing the making of center exits on near-side cars, the purchase of one-man cars for the unimportant outlying lines, the purchase of modern snow sweepers, and additional shop and carhouse facilities.

Of this \$4,000,000 which it is planned to spend \$2,000,000 represents renewals to property and will therefore be added to operating costs. The remaining \$2,000,000, representing additions to property, is properly capitalizable, but because of the fact that the company has no securities now salable from which new capital can be secured, the estimated \$2,000,000 of net earnings for 1921 which would otherwise be available for dividends on stock must be used to meet the cost of this new construction.

The practice of appropriating Philadelphia Rapid Transit surplus to provide for the capital needs of the property conforms with the procedure of the past ten years of the present management. During that time there was earned a surplus of \$10,051,000. Of this, however, only \$5,846,000 was declared in dividends. The remaining \$4,195,000 has been used for construction purposes and acquiring new property.

In the matter of traffic handled Mr. Mitten stated that for each of the ten years 1911-1920 there was an average yearly increase of 46,827,145 passengers. The system, however, during the first five months of 1921 not only suffered the loss of this normal increase, which approximates 4,000,000 passengers per month, but has actually carried 24,401,705 fewer passengers than were carried during the same months

of 1920. In May alone the traffic decreased 10 per cent, which, if it continues, will mean supplying the public with 10 per cent better service.

Passenger earnings for the first five months of 1921 increased \$2,451,456 over the corresponding period of 1920. Mr. Mitten says that \$4,500,000 of increased passenger earnings for the full year 1921 as compared with 1920 is all that can be now counted on in view of this declining rate of monthly increase. Operating costs are higher because of the increased allowance required for renewal account necessary to make the desired improvement in the condition of the property. This, together with sundry improvements in service, will not only use up the money saved through decreased wages, but in addition serve to increase considerably the total costs of operation. The net income for the year 1921 is estimated at \$2,000,000.

Pittsburgh Receivers Authorized to Start Improvements

The receivers for the Pittsburgh (Pa.) Railways have been authorized by the United States District Court to proceed with the company's share of the work of widening East Carson Street from the Smithfield Street Bridge to South Seventh Street. This authorization has eliminated litigation which threatened a long delay in the work as the city had previously filed a bill in equity asking that the receivers be compelled to perform this work. Litigation over this bill would have delayed the improvement for months as had there been an adverse decision in the suit in the District Court the city had intended to appeal to the higher Federal courts.

The thoroughfare, one of the big municipal projects, is to be widened from a 50-ft. to a 75-ft. street, at a cost of \$500,000. The cost to the receivers of the Pittsburgh Railways will be \$115,000. The receivers asked the court for the authority to do the work. With this permission granted it is hoped to have the work finished by October. The railway will relay and realign its tracks, relay the paving within the track area and 1 ft. on either side with reclippped stone block paving, and make such changes as are necessary in the overhead construction.

Trackless Trolley Considered for Toledo.—Street Railway Commissioner Cann at Toledo, Ohio, is collecting data on the trolley bus and has already intimated that such cars may be used to provide a new cross-town line in that city.

Arbitrators Cut Wages

Men on New York State Lines Reduced 11.7 per Cent—Maximum for Trainmen Fifty-three Cents.

Motormen and conductors of city lines of the New York State Railways will get a basic wage rate of 53 cents an hour from May 1 of this year to May 1, 1922, under an award announced on June 18 by the arbitration board, consisting of Judge Arthur E. Sutherland, impartial member, and B. E. Tilton and James H. Vahey, representing the company and the Amalgamated Association, respectively. This is a reduction of 11.7 per cent under the basic rate of 60 cents an hour of the 1920 agreement.

By this award motormen and conductors serving for the first three months will get 49 cents an hour, for the next nine months 51 cents, and after a year the full 53-cent rate. The pay of shop men and miscellaneous employees is reduced 2½ per cent from the rate fixed a year ago, and watchmen, car cleaners, car washers, track Sanders, track cleaners, flagmen at crossings, chauffeurs, car placers and unskilled laborers generally are reduced 15 per cent.

Under this award the lowest rate that will be paid will be to unskilled carhouse and other laborers. They will get 42½ cents an hour.

There were 102 proposed changes in the working agreement, most of which were disposed of by agreement between Mr. Tilton and Mr. Vahey without the interposition of Judge Sutherland. Few changes, however, over the 1920 agreement were decided on, and those that are made were decided on in the expectation they will result in betterment of service and will tend to greater efficiency and simplicity of operation without injustice to anyone. The provision for the basic nine-hour day is continued, with a leeway of three-quarters of an hour to complete schedules when necessary.

No important changes are made in the matter of "swing" runs. The company proposed they should be completed within fourteen consecutive hours and in no case exceed fifteen hours. The 1920 contract provided that at least 60 per cent of all schedule runs shall be laid out with outside time not to exceed eleven hours, and "in no case is a schedule run to have outside time in excess of fourteen hours." Provision for overtime extra under this clause, in the 1920 contract, is discontinued, however, but the men are given the option of working this overtime.

By the award motormen and conductors on interurban lines of the com-

pany will get a basic rate of 55 cents an hour. For the first three months they get 4 cents an hour less and for the next nine months 2 cents an hour less. Lines affected are the Utica Interurban, Sodus Bay Line, and the Rochester & Eastern. Men of the Oneida line get 3½ cents an hour more.

The award provides that operators of one-man cars, now running in Syracuse and contemplated for Utica, shall get 5 cents an hour more than motormen and conductors. This is the demand made by the men.

All three of the arbitrators signed the award.

City Outgeneraled by Company Talent

Paul H. Maloney, Commissioner of Public Utilities at New Orleans, La., in a lengthy report to the Commission Council on June 14, confirms the opinion generally prevalent that the present city administration is unable to cope with the traction problem and is sorely in need of men with proper training and experience adequately to safeguard the interests of the city. He said:

It must be remembered that the present administration is a new one, unfamiliar with the affairs of the city of New Orleans and without the benefit of experience or expert training and advice.

He contrasted the position in which the city now finds itself with that of the New Orleans Railway & Light Company, with its formidable array of legal and engineering experts, who were, he said, conducting a "propaganda campaign" against the city authorities, through C. C. Chappelle, whose plan Mr. Maloney rejected.

Mr. Maloney thought the Chappelle plan was formulated for the purpose of "undermining the Commission Council rather than to seek a settlement based upon a fair and equitable basis." He believed the city authorities had "piddled" long enough with the situation. The time had come, he said, when definite and concerted action should be taken by the Council. He pleaded for an organization of experts in banking, engineering, accounting and law which would be able to assist the city in its battle for reasonable rates and service.

Mayor McShane concurred in the views held by Commissioner Maloney.

Commissioner Black believed that Commissioner Maloney's suggestion was one that should have been carried out long ago. He said:

We have been going around armed with a sling shot to attack an entrenched giant. We must arm ourselves with a weapon that will dislodge the forces against us and we cannot do it without the assistance of technical men to supply the things we need.

Mr. Murphy, of the committee on finance, objected to the immediate adoption of the Maloney plan, because of the financial outlay involved.

The report was referred to the committee on finance. It will come up for discussion and consideration at the next meeting.

More Wage Cuts

Arbitrators Reduce Wages Below Offer of Company, Which Men Rejected —48-Cent Maximum

Platform employees of the Cincinnati & Dayton Traction Company will receive a maximum wage of 48 cents an hour, in the case of those employed on the interurban division, and 45 cents an hour in the case of those operating on the Hamilton city cars and the Dayton city cars, as a result of the decision of the board of arbitration agreed upon to settle the controversy between the company and Division 738 of the Amalgamated Association. The board completed its work a short time ago, with the vote of the men's representative dissenting.

STATE INDUSTRIAL COMMISSION APPOINTED THE REFEREE

The board was composed of Mahlon Gebhart, Miamisburg, representing the employees; Samuel D. Hutchins, Columbus, representing the company, and Prof. Joseph S. Myers of Ohio State University as the third arbitrator, or referee. The referee was chosen by the Ohio Industrial Commission, after the representatives of the company and men had failed to agree on a selection.

A change in the contract agreed upon names one of the federal judges of the Southern District of Ohio as the appointing power in case of disagreement over the selection of a third arbitrator in future disputes, instead of the State Industrial Commission.

The wage rate for the trainmen agreed upon by the members of the commission is as follows:

Interurban men: 44 cents an hour for the first three months; 46 cents, next nine months; 48 cents, thereafter.

Hamilton and Dayton city divisions: 41 cents an hour, first three months; 43 cents next nine months; 45 cents, thereafter.

Helpers on freight cars are to get 40 cents an hour.

Under the agreement existing before the new rate became effective, the maximum pay was 51 cents an hour. The large increase asked by the men was refused by the company, which offered as a counter proposal to continue the existing rate, under which interurban men received 51 and city men 50 cents an hour. The men refused this in turn and arbitration was agreed upon. The men would have gained had they accepted the company's counter proposal.

FIVE CITY SYSTEMS IN DAYTON

Dayton has five distinct city railway systems. In the case of the Dayton city system, whose employees are receiving a maximum of 62 cents under an arbitration award made on July 6, 1920, of which Mr. Hutchins was a member, this company has posted notices that effective on July 6 this year, the maximum will be reduced to 45 cents an hour.

One of the changes agreed upon by the arbiters in the Cincinnati & Dayton Traction Company dispute is that

changing the status of men who have been discharged by the company. The old agreement forbade rehiring after discharge, but the new code reads that "such employees shall not be re-employed in a like capacity within a period of six months."

Power House Strike to Be Arbitrated

Pending arbitration the strike of stationary engineers employed at the power houses of the Cincinnati (Ohio) Traction Company is at an end. All the men who went out on May 30 have returned to work and all inclines with the exception of the Bellevue are again in operation. The Bellevue is closed down for repairs. Under the terms of the arbitration agreement the company and the union will select representatives and should they not be able to agree on the third member within ninety days he will be named by Superior Court Judge Robert S. Marx. The traction company has designated J. A. Brett, district manager of the Westinghouse Electric Company, as its arbitrator. Business Agent C. B. Manwood, of the union said the executive board of the organization would name its representative at once. The decision of the arbitration board will be retroactive to the time the men went to work. The engineers struck against a decision of the company to reduce their wages from 90 cents to 65 or 70 cents an hour. The men demanded the continuance of the old scale of 90 cents an hour.

Wage Reduction Under Consideration

The management of the Interborough Rapid Transit Company, New York, N. Y., has taken up in friendly discussion with the officers of the organization representing the men the matter of the revision of the present working agreement some time between now and its expiration. The hope is to reach a conclusion which in the light of the financial condition of the company will be to the best interest of the employees themselves as well as of the company.

The present agreement between the management and the men expires on Jan. 1 next.

The last increases in wages were made by the company in August, 1919, at which time wages were increased 25 per cent above the rates in the working agreement covering wages then in existence, and in June, 1920, when wages were increased 10 per cent above the rate in effect on Aug. 1, 1919.

The principle behind these adjustments of wages was the increasing cost of living, the company recognizing this high cost of living as a fact which had to be considered even in the face of an existing working agreement. In this connection the company explains:

Beginning practically with the date of the last increase the reverse of this has been true, and the cost of living as shown by the same government statistics has been steadily declining for some time—a fact generally recognized and admitted.

Home Rule and Five-Cent Bills Lost

New Public Utilities Act Passed in Illinois, but Only After All Dangerous Features Were Eliminated

The so-called 5-cent fare bill fathered by Mayor Thompson of Chicago was voted down and thrown into the discard with the adjournment of the Illinois State Legislature on June 19. At the same session a new public utilities commission bill was approved which is supposed to hold out the hope of "home rule" over some of Chicago's utilities. The outcome on both these bills was a sore disappointment to Mayor Thompson and his followers and was preceded by bitter debates which stretched the session up to the legal time limit.

GOVERNOR SMALL was closely allied with the Chicago political element and used every effort to save both measures. After adjournment he issued a statement expressing his disappointment and announcing that he would call a special session so that the legislators might have time to reconsider. There was comment to the effect that Mayor Thompson would use his influence with the present commission to bring about a reduction at once in the 8-cent fare of the Chicago Surface Lines.

COMMISSION NAME CHANGED

If Governor Small approves the new utilities act the commission will be known hereafter as the Illinois Commerce Commission. Its membership will be increased from five to seven members and seven assistant commissioners. Another change in the present law will allow appeals to the Circuit Court of the local county instead of to the Circuit Court of Sangamon County only. The bill was stripped of the clause giving city councils power to initiate a referendum for home rule. This can only be attained by a petition signed by 25 per cent of the registered voters in a community. The Legislature also wiped out the section which would prevent the commission from setting aside contracts between municipalities and utility corporations.

An attempt was made to strike out the whole home rule section of the bill. This failed, but the measure was amended to provide that if home rule is established in any community rulings may be appealed to the state commission and from that body to the local Circuit Court and thence to the Supreme Court. Inasmuch as home rule can be established only over utilities entirely within the city limits, this is said to eliminate all except the surface lines and the gas company in Chicago. It is contended that the bill in its present shape is not more drastic than the existing measure.

MAYOR THOMPSON FOUGHT THE FIGHT

The fight on Mayor Thompson's 5-cent fare bill was one of the features of the closing days of the Legislature. This bill provided that surface and elevated lines might be acquired, with the approval of the people, through the creation of a "transportation district"; that operation of the lines would be conducted by nine trustees; and that the "district" would have authority to

issue bonds for purchase of the railway properties. The Mayor suffered his most serious defeat when the 5-cent clause was stricken out. It was intended that any deficit to meet costs would be made up by general taxation. Mayor Thompson went to Springfield to urge passage of his bills and he admitted that he would favor 4-cent, 2-cent and even 1-cent fares if the people voted for such rates. He even was quoted as saying that he would favor free street car service if the people voted for it. This roused some of the Senators to much stronger opposition.

As finally amended the bill allowed the board of trustees to determine the rates of fare and charges upon transportation systems and a referendum would be required on all bond issues. It was also provided that no community would be combined with a "transportation district" without consent of its voters. With all these amendments taking the political attractions from the bill the measure was lost by a close vote in the closing hour of the legislative session.

Railway to Run Buses

Connecticut Company Announced Plan at Bridgeport Hearing Before Public Utilities Commission

Under the recent authority granted by the State Legislature the Connecticut Company proposes to establish five motor bus routes, three in Bridgeport. This announcement was made at a hearing before the State Public Utilities Commission held at Bridgeport June 21-22, on applications for certificates of public convenience and necessity to operate motor buses in Bridgeport and vicinity after July 15 when all motor bus lines come under the jurisdiction of the Commission.

The Connecticut Company, President Storrs said, was prepared to undertake a bus service complementary to that of the electric railway with a free interchange of transfers within the city area between the buses and trolley cars.

The city of Bridgeport petitioned for the authorization of thirteen routes some of which competed with the trolley. Under the city's plan the number of buses in operation would be cut from 200 to 88. More than 500 sought permits to operate these routes, modification of which was asked in some cases. One application from the American Transit Company, a recently formed stock cor-

poration, sought the right to operate all routes as laid out. It was brought out that the city was probably 50-50 for trolleys and jitneys and would resent the loss of either.

Percy T. Litchfield, head of the city's traffic commission, represented the local Chamber of Commerce. He declared that a limited bus system was necessary in addition to the trolley service and that if the railway would meet the needs for bus lines on some routes no other permits should be given. The chamber wanted to see the trolley system get on its feet and be alive to modern conditions. In short, transportation by motor vehicle has come to stay no matter what fare may be required to support the service. If the officers of the railway took advantage of the rights they now have to operate supplemental bus service, it would be possible for them to handle the situation, but with their trolley cars alone they cannot do it since the people have experienced the advantages of the jitney service.

The company in its testimony brought out that in 1920 for the Bridgeport division operation expenses and taxes exceeded revenues by \$470,000.

No allowance is made for depreciation. In the Commission's own valuation for this division of \$8,000,000, based on 1910-1914 prices or of \$14,400,000 on 1919 prices an 8 per cent return would bring the losses up to more than a million dollars, exclusive of any allowance for depreciation. For the first four months of 1921 with service materially curtailed and the closest watch over expenditures and every possible economy, the operating expenses and taxes still exceeded the revenues by \$17,818.

For Labor Unions: A Receipt for Immortality

An editorial with this title from *America at Work*, a publication issued in St. Louis, has been reprinted in pamphlet form by Ivy L. Lee. The editorial declares that the labor union should not place so much emphasis on the possession or non-possession of a union card, but should declare its interest in "good working conditions, good wages and the highest possible standard of craftsmanship." It says that all "closed" shop organizations are despotisms, whether they are a church, university, school of medicine or labor union, and that union labor should go as far as modern churches, schools, physicians and insurance companies in placing emphasis on the end and not the means, on the aims of the organization and not on membership in the organization itself.

The pamphlet also says that mere display of power will not insure immortality. Modern men do not back down before power as such at all. They only yield respect to the foundation of power, and power in a democracy can have no permanent foundation except in service.

Byllesby Property Slightly Damaged

According to a recent statement the Arkansas Valley Railway, Light & Power Company, a Byllesby property, suffered only slight damages in the Pueblo cloudburst and flood. R. G. Hunt, assistant to the vice-president of the Byllesby Engineering & Management Corporation, was one of the first outsiders to reach the scene of the disaster. He said in part:

Our street railway during the early hours of the flood continued in service, carrying the panic stricken out of the flood district. The cars operated until it was no longer possible to operate the power plant. There were many notable instances of individual bravery. Construction Superintendent Phythian, who stuck to the power house to the last, was marooned on top of the new steel structure all night. Early next morning when the waters had subsided he attempted to wade out, and was caught in the swirl of water. After a hard battle for his life he was drawn to safety by means of a rope thrown to him.

Stockholders of the company have been assured of their investments by means of a circular letter sent out on June 14, after the property loss had been ascertained. The management states that the Pueblo plant will be in full operation in two weeks.

Evidence Piling Up Favorable to Hydro-Electric Project

Bion J. Arnold's report received further consideration from the Ontario Hydro Radial Railway Commission during the week ended May 14. Frank A. Sager, managing engineer for Mr. Arnold, gave evidence in the absence of the latter from the city.

The Toronto Suburban system, as projected, will consist of the existing lines of the Toronto Suburban Railway operating from Keele Street to Guelph, to Woodbridge and to Weston, as well as the present Davenport, Crescent and Lambton lines. Mr. Arnold suggested that the Guelph division be changed and the cars operated right into the downtown terminal in Toronto, in 1925, by constructing then a connection from Lambton to the Toronto-St. Catharines Radial at Swansea via the old belt-line route.

The traffic counts made in Toronto showed that of the total traffic carried by the street car lines in that section 48 per cent was rush-hour traffic carried in the three busy hours of the day; 6 a.m. to 8 a.m. and 5 p.m. to 6 p.m. The other 52 per cent was distributed over the remaining sixteen hours of the operating day. This showed that Toronto probably had a higher traffic peak than any other city in North America. The practice of selling eight tickets for 25 cents for rush-hour riding was wrong from a financial point.

With respect to the interurban service of the Toronto & Eastern, which it was proposed should be operated to Bowmanville, 40 miles, it was shown that the riding habit of the population in that territory would mean 1,640 passengers per day into the Toronto terminal. This estimate did not include the actual count of passengers riding between stations along the route.

Dealing with operating expenses of the whole system of hydro-radials, Mr. Sager submitted figures of fourteen radial lines in the United States showing a range of 60½ down to 32.4 cents per car mile. The hydro-radial figures for the five divisions were 28.7 cents. This difference was accounted for by the fact that the hydro system as proposed was the only one on the American continent having 300 miles of lines that embraced rapid transit, interurban, express and heavy freight services.

The Guelph Radial Railway system has been transferred to the Hydro Commission in accordance with the Order-in-Council recently passed by the Ontario Government. Manager House will be retained as the operating head by the commission.

News Notes

Little Rock Men Win.—Union employees of the Little Rock Railway & Electric Company, Little Rock, Ark., won their wage controversy from the company in an award handed down by the board of arbitrators on June 10. The vote was unanimous against a decrease in the men's present scale of from 46 to 51 cents. The award will serve as a one-year contract.

\$1,000,000 Electrification Project.—The Electric Short Line, Minneapolis to Hutchinson, Minn., is to be extended 25 miles and electrified. The estimated cost of the project is \$1,000,000. Work is expected to begin by July 1. The overhead trolley will replace the gas-electric and oil-burning locomotive. E. D. Luce, president of the company, is a member of the executive committee of the American Short Line Railway Association.

Five Cents an Hour Wage Cut.—Motormen on the lines of the Sault Ste. Marie (Mich.) Traction Company were recently informed of a wage cut of 5 cents an hour. The reduction became effective on June 1. The wage was 48 cents an hour. Manager Taylor announced that this action on the part of the company was necessary and that the recent increase in fares had not materially affected the financial condition of the company.

Trackless Trolley Under Consideration.—The trackless trolley is being considered for adoption in Grand Rapids, Mich., as a solution for the present need of extensions to existing lines of the Grand Rapids Railway. Officials of the railway do not believe that the proposed innovation will be feasible for thoroughfares which carry heavy traffic, but it is thought that many residence streets in outlying portions of the city where extensions are needed might prove ideal for the operation of such lines.

Wage Cut Rejected.—The employees of the Atlantic City & Shore Fast Line Railroad, Atlantic City, N. J., have refused to accept a proposition made to them by the management that the men take a voluntary 10 per cent reduction in wages to assist in the effort to get back to normal living conditions.

Wage Offer Rejected.—The trolley men of the State have rejected the wage offer of the Connecticut Company, which fixed a minimum of 49 cents for the beginner and a maximum of 54 cents an hour for the old-timer. It is said that by a four to one vote the local conductors and motormen at New Haven rejected the offer, which is the second one and about a nickel an hour better than the first offer, which also was rejected by a referendum vote of the men. It is believed that the matter will go to arbitration.

Wages Cut in Dayton.—It is expected that all railway properties in Dayton, Ohio, will unite in a uniform wage reduction. Managements of the Oakwood Street Railway, the Dayton, Springfield & Xenia Southern Railway and Dayton Street Railway have announced a wage cut of practically 17 cents an hour. The new scale will be 41 cents for the first three months, 43 for the next nine months and 45 cents for all over twelve months' service. The present scale is 58, 60 and 62 cents an hour. The cut is scheduled for July 6.

Wages Increased in Worcester.—An increase in wages of 3 cents an hour for trainmen went into effect on June 1 on the lines of the Worcester (Mass.) Consolidated Street Railway under a contract that terminates on Dec 31. It is said that the added expense to the company until the end of the year will be \$80,000. The new wage scale will give employees for the first three months' service with the Consolidated 58 cents an hour; for the next nine months, 63 cents an hour, and after the full year's service the men will receive 68 cents an hour.

London Workshop Cost Underestimated.—In a previous item in the *ELECTRIC RAILWAY JOURNAL* on the erection of workshops by the London underground electric railway companies and the London General Omnibus Company the cost of the project and the area covered were inaccurately stated. The railway shops will cover an area of 28½ acres and will cost approximately £450,000 inclusive of price of land, cost of buildings and equipment. The omnibus depot will cover 30 acres and will cost approximately £500,000 inclusive of the land, buildings and equipment.

Franchises Surrendered in Indiana.—Local franchises in six cities—South Bend, Mishawaka, Elkhart, Goshen, Laporte and Michigan City—have been surrendered by the Chicago, South Bend & Northern Indiana Railway, which made application recently to the Indiana Public Service Commission to operate under indeterminate permits. This is the second large corporation outside of Indianapolis to accept in-

determinate permits granted under the act which established the public service commission and abolished the railroad commission.

Men Accept Wage Cut.—Officials of the Southern Indiana Gas & Electric Company, Evansville, Ind., recently signed an agreement with the union for one year, calling for a reduction in wages amounting to 18 per cent. The men working on the city cars under the new agreement will receive from 36 to 43 cents an hour; the men on the inter-urban cars from 38 to 43 cents an hour and the men on the one-man cars will get from 40 to 45 cents an hour.

To Pull Together for Mutual Benefit.—The San Francisco-Oakland Terminal Railways, Oakland, Cal., has recently created a Department of Personnel "for the systematic supervision, study and improvement of the human element in organization." The new department will have as its watchwords, justice, co-operation and economy. In taking a personal interest in every employee the Committee on Personnel will know what employee should be transferred to other departments, who should be advanced, etc. The training of platform men will be one of the duties when space and equipment are available.

"Electric Railway Service" Suspends.—The Detroit (Mich.) United Railway has suspended publication of *Electric Railway Service*, established in June, 1913, and the forerunner of many similar publications issued at this time. Economies are necessary and the company being opposed to carrying advertising in the publication, "it is quite necessary that suspension follow when the revenues are not sufficient to meet expenditures." In conclusion this opinion is expressed: "We feel sure that thousands of our friends and patrons will rejoice when conditions change and a renewal of publication becomes possible."

Federal Commission to Study Waste.—A federal commission to study waste elimination in industry is proposed in a bill which has been introduced by Senator Calder. The bill is intended to continue and to amplify the survey made by the Federal Engineering Societies at the instigation of Herbert Hoover, who at that time was president of the organization. The commission is to be composed of seven commissioners to be appointed by the President, and the Secretary of Commerce is to be chairman of the commission. The final report is to be made on or before Sept. 21, 1922. The report is to cover waste in "timber, power, transportation, oil, coal, essential minerals and other basic raw materials." The commissioners are to serve without salary.

No Plans Formulated by Commission.—F. H. La Guardia, president of the Board of Aldermen, New York, N. Y., recently issued a statement in which he charged that "all promises of new lines and new extensions made when the new transit law was under discussion were empty promises not capable of being kept." This statement was

made as a result of the failure of Mr. La Guardia to exact a pledge from George McAneny, chairman of the new transit commission, that a 5-cent rate of fare would be retained on the rapid transit lines. This promise would have been reciprocated by the Board of Estimate appropriating funds for the commission. Mr. McAneny's letter to Mr. La Guardia stated that no conclusion had been reached in relation to the commission's plan.

Wages Remain the Same.—A wage settlement for the year ending May 31, 1922, has recently been effected directly between the Asheville Power & Light Company, Asheville, N. C., and its trainmen on the basis of the present scale running from 48 to 56 cents an hour. The agreement is subject to termination upon the giving of sixty days' notice by either party. The arbitration board appointed about a year ago to determine upon a scale of wages to be paid the trainmen of the company, for the year ended May 31, 1921, fixed a wage scale of 48 cents an hour for the first six months, 49 for the second six months, 50 for the third six months, and 56 cents an hour thereafter. This year the trainmen submitted to the company an agreement calling for a wage scale running from 54 to 60 cents an hour.

\$500,000 to Aid Industry.—With the passage of the second deficiency bill by the Senate, the Department of Commerce is certain to receive the \$500,000 asked by Secretary Hoover for the specific purpose of aiding industry. Of the amount, \$250,000 will be expended in an effort to encourage foreign trade. The remainder will be utilized in various types of investigation and research looking to simplification, standardization and improvement in industrial practices and devices. The detailed plans for expending this money in the most effective way possible now are being worked out. As this is written, the bill still is in conference, but no great amount of difficulty is anticipated in harmonizing the differences between the bill as passed by the House and as it finally emerged from the Senate. That the President will sign the bill is a foregone conclusion.

New Franchise Urged in Houston.—Luke C. Bradley, vice-president and general manager of the Houston (Tex.) Electric Company, has notified Mayor Oscar F. Holcombe and members of the City Council that his company is ready to open negotiations with the City Council looking to the granting of a new railway franchise. The company has been operating under a temporary arrangement since it won its fight in Federal court for an increased fare. Negotiations opened several times since the company's victory in court have resulted in a deadlock each time, and the company has continued to operate under the court's order. Mayor Holcombe and members of the City Council have declared that any new franchise must include the expenditure of large sums for improvements, extensions and better-

ments. The fate of the jitneys in Houston also is a point that will be settled in the franchise negotiations.

Public Service Men Accept Cut.—The trainmen on the Public Service Railway of New Jersey, Newark, have voted to accept a reduction in wages of approximately 10 per cent. The new scale will be 46, 48 and 50 cents an hour, with 5 cents additional to operators of one-man cars. This is the scale fixed by the War Labor Board in 1919. The present rates are 50, 53 and 55 cents an hour. The company wanted to revert to the rates of 41, 43 and 45 cents an hour. A two-year agreement containing this scale was signed on June 22 by the joint conference board of the company and of the Amalgamated Association. The men had previously refused to accept a proposed reduction of 20 per cent. The new scale will go into effect on Aug. 1. Every employee of the company now a member of the Amalgamated Association will be bound by the terms of the new contract. New men will be taken on irrespective of any union affiliations.

Fate of Railway in Hands of City.—Unless the taxpayers of Brunswick, Ga., are in favor of buying the City & Suburban Street Railway, which operates in that city, and maintaining it as a going concern the threatened junking of the line will take place. The bondholders foreclosed their mortgage on the property recently. At a conference on May 11 between the Board of City Commissioners and representatives of the Board of Trade a proposal was made by the company that the lines be purchased and operated by the city government. In its statement the company suggests an extension of the line to Arco and expresses the belief that such extension would put the line on a paying basis if properly managed and operated. The property includes 8½ miles of track with the necessary wire, poles, etc., five motor cars and six trailers. It is believed that a questionnaire will be submitted to the voters in regard to the purchase of the line by the city government.

Programs of Meetings

Amalgamated Association of Street & Electric Railway Employees

The seventeenth convention of the Amalgamated Association of Street & Electric Railway Employees of America will be held on Sept. 12 at Auditorium-Armory, Atlanta, Ga. The headquarters will be at the Ansley Hotel.

Society for the Promotion of Engineering Education

The Twenty-Ninth Annual Meeting of the Society for the Promotion of Engineering Education will be held at Yale University June 28-July 1, 1921. The meetings will be held in college buildings, at the Lawn Club and at the Country Club.

Financial and Corporate

Wheeling Roads Sold

Controlling Interest in City Railway and Affiliated Lines Secured by Providence Bankers

Sartorius & Company, Providence, R. I., have purchased a controlling interest in the West Virginia Utilities Company, which controls the Wheeling Public Service Company and the City Railway. The management of these properties has for some time been under the direction of the W. S. Barstow Management Corporation, which has been represented locally by J. D. Whittemore. At a recent meeting of the board of directors it was determined to continue the present management for the time being. The directors instructed Mr. Whittemore to co-operate in every way with M. R. Stern, the engineer representing Sartorius & Company.

Mr. Stern is now manager for Sartorius & Company at Chattanooga, Tenn., for the Public Light & Power Company. He expects to divide his time between Wheeling and Morgantown. In commenting on the situation in Wheeling Mr. Stern said:

The situation in Wheeling presents a number of perplexing problems. I can't say now, off hand, what will finally be done in respect to some of these difficulties, but the new owners of the Wheeling properties are going to do everything in their power to keep these roads going. The competition of the bus lines makes the difficulties of the railways greater.

It would be very unfortunate, indeed, for the residents of that fine section Out-the-Pike and on through your fine valley to West Alexander if it should become impossible to operate the road longer.

According to Mr. Stern the new owners of these roads would like to see the properties held intact, but with the problems confronting the roads, their future is rather uncertain. The proposal to abandon operation of the City Railway will be dropped for the present, although the change in ownership does not necessarily change the status of that problem. Mr. Stern said further that as regards Wheeling, no change in the rates of fare or in the operation methods is contemplated.

Large Budget for M. O. Construction

According to the Detroit *Free Press* \$1,000,000 will be added this year to the upkeep of the Department of Public Works for the construction of the municipal railway in Detroit. This is another example of expenditure not charged to the railway property on account of municipal operation. In various sections of the city repaving and resurfacing have been undertaken in this construction. To meet the cost of this resurfacing Mayor Couzens requested the Council to add another \$1,000,000 to the budget. No part of the money will be taken from the

\$15,000,000 voted by the people for a municipal railway system. The *Free Press* says:

The department of public works is not the only department of the city which was forced to add to its budget in order to shoulder part of the expense of the municipal operation system. The public lighting department, the water board and the forestry department have all been called upon to make large expenditures in order that work on municipally operated lines should not all be charged against the \$15,000,000 appropriation.

The commission and the Mayor have announced that the new lines are being constructed more cheaply than railway lines ever were constructed in any other American city. The actual cost to the street railway commission is about \$62,000 per mile, according to Ross Schram, the secretary.

Municipal Railway Bonds Taken

A new syndicate, composed of the Guaranty Company, the National City Company, Bankers' Trust Company, Harris, Forbes & Company, Eastman, Dillon & Company, E. H. Rollins & Sons, all of New York, and Keane, Higbie & Company and the Detroit Trust Company, of Detroit, has purchased of the city of Detroit \$2,000,000 bonds; \$1,000,000 of 5½s, due May, 1949, and \$1,000,000 of 6s, due June, 1947. The syndicate has also taken over the small remaining balance of bonds in the previous syndicate and is offering the 6 per cent bonds, maturing in various amounts from 1927 to 1951, on a 5.60 basis, and the 5½ per cent bonds, maturing from 1931 to 1948, at par.

The \$2,000,000 city of Detroit 5½s and 6s are issued by the city for street railway purposes, and are the bonds recently validated by the Supreme Court of the State of Michigan. The decision of the court handed down on June 6 referred to a similar suit in the Federal courts, in which, upon appeal, the Supreme Court of the United States held that the proceedings to authorize the municipal railway to issue bonds were regularly taken. The Michigan Supreme Court also went on to uphold the validity of the special election held by the city on April 5, 1920, at which the voters by a very decided majority authorized the bond issue and municipal street railway program, and upheld the power of the city to issue the bonds, assume the obligation and to "convert money raised by taxation to the construction of its street railway system."

The bankers explain that this action of the court effectually disposes of any question as to the validity of the bonds and establishes their investment position.

Dividends Paid in Scrip

Holding Company with Large Oil Interests Conserving Its Resources — Shares Sell Down

Dividends of the Cities Service Company, New York, N. Y., are for the present to be paid in scrip instead of cash. This decision was made by the directors on June 15. No maturity date has been set for the scrip. Moreover, the scrip does not bear interest. In case of stockholders forced to sell their scrip, it is said that Henry L. Doherty, fiscal agents for the Cities Service Company, have planned a syndicate to take over the scrip at the market. The company has outstanding with the public more than \$77,000,000 of cumulative preferred stock, more than \$3,000,000 of ordinary preferred stock and \$45,000,000 of common stock. In addition there are close to \$30,000,000 of debentures outstanding.

MOST EARNINGS FROM OIL

While the company controls electric and railway properties, its principal source of income is derived from its oil holdings and leases. The gross earnings for 1920 were \$118,000,000, the net after preferred dividends were paid being more than \$18,000,000.

A statement by the Cities Service Company to stockholders gives at length the memorandum submitted by H. L. Doherty, president of the company, to the directors. He said that his recommendation for the suspension of the dividends had been reached after numerous conferences with the most notable oil men. Nearly all agreed that the present excessive production of oil over the demand could not last long, and that a period of shortage was in prospect. He said that by the decisive action at this time in suspending the dividends the directors would be able greatly to increase the value of the company's assets, resume cash and stock dividends at an early date, with the payment of all scrip issued for dividends, and be able again "to reward our stockholders in a handsome way for having accepted a change from our present dividend policy to one wherein we will issue only scrip."

The effect of this action on the stock was greatly to depress all the various issues, although they necessarily suffered in the general decline which has recently been in evidence. Cities Service common has sold down to about 130 from a high of 259 last year.

Commission Approves Sale. — The Public Utility Commission of New Jersey has approved the application of the Five-Mile Beach Electric Railway, Wildwood, N. J., for the sale of a plot of land in Wildwood, N. J., for a consideration of \$7,500. Approval was also granted for the abandonment of tracks on what is known as the loop at Wildwood Crest. Need for the loop has disappeared since the introduction of double tracking, it was testified.

Answers to Accounting Questions

Another Series of Questions and Tentative Answers Under the Uniform System of Accounts for Electric Railways

Another series of tentative answers to questions raised in connection with the uniform system of accounts, prescribed by the Interstate Commerce Commission, has just been issued. As these answers have not received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission.

THE case numbers covered below are from A-602, b to A-614, with certain omissions. Another installment will follow. The omitted numbers represent cases which either are not of sufficient importance to justify publication or involve questions upon which a definite conclusion has not been reached.

Q. (A-602, b). What is the correct accounting for the cost and maintenance of smokestacks erected at power houses?

A. The cost of smokestacks which are not permanent as to position but are attached to and are part of the boilers shall be charged to account 542, "Power plant equipment." If they are permanent in position and will remain as part of the building structure in case the other equipment is removed, account 539, "Power plant buildings," shall be debited. Maintenance shall in each case be charged accordingly.

Q. (A-603). Paving assessments are paid in installments, each payment covering one installment and the interest due on the deferred payment. What is the proper accounting?

A. If the cost of property assessed is carried in account 401, "Road and equipment," the proportion representing the principal of the assessment shall be debited to account 511, "Paving," or to account 10, "Paving," depending on whether the assessment is for installation of new paving or the improvement of old paving, or for pavement maintenance. If the cost of the property assessed is carried in account 404, "Miscellaneous physical property," the proportion representing the principal of the assessment, if for new paving, or the improvement of old paving, shall be debited to account 404, and if for pavement maintenance, to an account includible under accounts 205, "Net income from miscellaneous physical property," or 219, "Net loss on miscellaneous physical property," as may be appropriate. The proportion of each payment which represents interest shall be charged to account 221, "Interest on unfunded debt." (See Case 267, Accounting Bulletin 14.)

Q. (A-604). To what account should be charged the pay of employees engaged in directing or overseeing "safety-first" and "prevention of accidents" work?

A. The pay of such employees shall be charged to accounts 1, "Superintendence of way and structures," 29, "Superintendence of equipment," 45, "Superintendence of power," or 63, "Superintendence of transportation," depending on the class of work upon

which they are principally engaged, except that the pay of employees or others engaged exclusively in the general promotion of "safety-first" methods among the public shall be charged to account 89, "Miscellaneous general expenses."

Q. (A-605). To what account should be charged the cost of loading, hauling, and unloading steam locomotive cinders accumulated at cinder pits and other places near shops?

A. The cost of loading shall be charged to account 75, "Operation of steam locomotives." The cost of hauling and unloading shall be charged to the appropriate maintenance, road or other account depending on the use made of them. If cinders are not used for any purpose the entire cost of removal shall be charged to account 75. (See Cases 166 and 289, Accounting Bulletin 14.)

Q. (A-606). To what account should be charged:

(a) The pay of cashiers at elevated and subway stations.

(b) The pay of chief cashier and assistants engaged in supervising the station cashiers.

A. (a) Pay of station cashiers is chargeable to account 68, "Station employees."

(b) Pay of chief cashier, if he is considered a general officer, is chargeable to account 83, "Salaries and expenses of general officers." If chief cashier is employed in the general office but is not considered a general officer, his pay is chargeable to account 84, "Salaries and expenses of general office clerks," as is also the pay of his clerical assistants.

Q. (A-607). What account should be charged with the cost of rebuilding a work car wrecked while it was being used for converting a trestle to an embankment?

A. If the wreck was directly attributed to work the cost of which is chargeable to account 504, "Grading," car repair costs shall be assigned to the same account, but if attributable to work chargeable as maintenance or was caused by transportation operations, repairs shall be charged to account 32, "Service equipment."

Q. (A-608). A carrier pays a power company a fixed rate per kilowatt hour for power used, and, in addition, a percentage of the cost of a transmission line built and maintained by the power company to serve the carrier. How should the payments be charged?

A. Assuming that the ownership of the transmission line remains with the power company, the entire amount paid

by the carrier shall be debited to account 59, "Power purchased."

Q. (A-610). A carrier installs a spur track in a street not previously occupied by tracks. How should it account for the cost of removing pavement preliminary to track construction, and the cost of replacing pavement after track construction?

A. The cost of removing paving shall be charged to account 504, "Grading," and the cost of the new paving to account 511, "Paving."

Q. (A-611) When a carrier sets up a depreciation reserve on way and structures, should it base its depreciation charges solely on the amounts in accounts representing specific property, such as account 506, "Ties," and 511, "Paving," or on amounts in all accounts for way and structures?

A. As the charges to operating expenses should represent the actual current loss from depreciation, they shall be based on the accounts which include depreciable property. It is required that the records shall be such that the depreciation accrued with respect to any particular unit of property may be readily determined and cleared from the reserve at the time such unit is withdrawn from service.

Q. (A-612) A carrier receives rental from property used by another carrier, the payment covering factors of rent, maintenance, and operation. Should the entire amount be credited to revenue account 115, "Rent of tracks and facilities," in accordance with the text of that account, or should that portion representing the cost of maintenance and operation be credited to primary operating expense accounts as indicated in Cases 332 and 403 of Accounting Bulletin 14?

A. Where the payment is for rent of tracks, terminals, or bridges which are jointly used the full amount shall be credited to the appropriate rent account regardless of the basis used in determining the amount of the payment, but where the payment covers only a proportion of the cost of maintenance and operation of property which is jointly used and there is no element of rent involved, the amount shall be credited to the appropriate primary maintenance and transportation expense accounts.

Q. (A-613) To what account should be charged cost of publishing notices of fare increases, such publications being prescribed by city ordinance?

A. To account 80, "Advertising."

Q. (A-614) A carrier has established a department, under the care of a superintendent, for the operation of non-revenue equipment. How should the department expense be distributed?

A. The pay and traveling expenses of the superintendent shall be charged to account 83, "Salaries and expenses of general officers," and the other general expenses to account 84, "Salaries and expenses of general office clerks," 85, "General office supplies and expenses," and to account 94, "Stationery and printing," as may be appropriate.

Belgian Light Railways Being Rehabilitated

The report of the National Light Railway of Belgium (Société Nationale des Chemins de Fer Vicinaux) shows that the destruction of track caused during the German invasion is rapidly being repaired. During the past year 647 km. of track which had been demolished was again made ready for service and on Dec. 31, 1920, 3,388 km. was in operation. About 600 km. of track remained to be rehabilitated. During 1920 the company purchased 71,000 (metric) tons of rails and 1,897,645 ties. The Germans took from the property 427 steam locomotives, 14 electric motor cars, and 116 electric trail cars, but the greater part of this material has been recovered. The motive power used is both steam and electric, divided as follows:

Steam power on.....	3,852.11 km.
Electric power on.....	359.29 km.
Mixed service of steam and electric	84.45 km.
Total of lines opened for public service	4,295.85 km.

The extent of track on which electric cars are used, measured in miles, is 225. The service given throughout the system is a light railway service and some city tramway lines are included in the system. Altogether in its electrical equipment the company has 568 electric motor cars, nine gasoline-electric motor cars, 286 closed electric trailers, and 246 open electric trailers. At the end of the year sixty-nine electric motor cars were under order. The receipts during 1920 from all sources were Fr. 66,934,551, and the expenses Fr. 65,246,002.

Change Suggested in Mexican Financial Plans

A report of the London committee on the financial situation of Mexican Light & Power and the Mexican Tramways group of companies announces an issue of \$12,000,000 of 6 per cent debentures.

No interest has been paid on the various issues of bonds and on funded debts for over six years, and the aggregate of funds now available falls far short of the amount required to discharge the interest, quite apart from the principal of the unfunded debts, which are long overdue. The aggregate debt of the associated companies, as at the end of December last, was more than \$8,897,000. No dividend has been paid since November, 1913, on the \$6,000,000 of preference shares of the Light & Power company. The report says that the default of the associated companies is a direct consequence of the conditions prevailing in Mexico since 1911.

An outline of the provisional agreement gives in considerable detail plans for payment of a number of coupons forthwith, further payments by the end of June, 1922, and others a year later, but sinking fund payments to

be resumed in 1928 with all payments to that date to be waived. Bondholders are urged to accept the proposed plans as "being the best arrangement that can be effected in their interests."

The report says that although the position in Mexico remains difficult, the outlook is certainly more hopeful than it was.

Interurban Dissolution Petition Presented

A petition for the dissolution of the Ohio Electric Railway system was filed in the Federal Court at Toledo, Ohio, during the week ended June 18 by Receiver B. J. Jones, Columbus, who asks permission to surrender the leases of several of the subsidiary lines in the system.

The receiver alleges in the petition that the Indiana, Columbus & Eastern Traction Company, the Columbus, Newark & Zanesville Traction Company, and the Fort Wayne, Van Wert & Lima Traction Company, do not collect enough revenue now to pay the rental required of the Ohio Electric Railway.

The Ohio Electric wants allowance in stock for the cars used on these lines which it has purchased during its operation of the lines.

Mr. Jones says he believes he can make the Ohio Electric itself pay its way if it is released from the burdens of the other lines.

Judge John M. Killits has not made an order in the case.

Financial News Notes

Georgia Property to Be Sold.—The property and equipment of the City & Suburban Railway, Brunswick, Ga., will be sold on July 5 as a going concern. If a satisfactory bid is not received it is likely that the property will be sold as junk.

Traffic Decreases in Cincinnati.—Higher fares and industrial conditions in general have greatly affected the traffic handled by the Cincinnati (Ohio) Traction Company. During the month of May, 1921, there was a daily decrease of 39,963 passengers compared with May a year ago. The total decrease in revenue passengers for the month was 1,238,900.

Wants to Abandon Service.—The Union Railway, New York, N. Y., has applied to the Transit Commission for permission to abandon service on Jerome Avenue, Bronx. S. W. Huff, president of the company, said in the petition that the receipts of the property do not warrant continued operation; that the opening of the elevated part of the Lexington Avenue rapid transit line on Jerome Avenue had

taken most of the traffic in that direction. A public hearing on the abandonment will be held on July 21.

\$10,000,000 for Purchase and Improvements.—Civic Finance Commissioner Ross of Toronto, Ont., has been authorized by a by-law passed by the City Council to issue debentures for \$10,000,000. The Transportation Commission, which is preparing for the city to take over the Toronto Railway on Sept. 1, asked for \$7,000,000 and part of the balance of the \$10,000,000 will be used in the rehabilitation and operation of the system. In asking the Council for this amount, Commissioner Ross said he proposed to cancel some \$2,026,000 of the issue authorized last February.

More Eastern Massachusetts Lines to Stop.—The Mayor of Woburn, Mass., and the Selectmen of Burlington and Billerica were notified on June 4 by Homer Loring, chairman of the trustees of the Eastern Massachusetts Street Railway, that the Woburn-Billerica line would be posted on June 6, for discontinuance, to be effective on and after June 13. The company says it is compelled to take this action because of the failure of those three communities to take the necessary steps to eliminate jitney competition. The proposed change will cut off all connection between Woburn and Lowell and intermediate places.

Stockholders Not Liable.—Stockholders of the Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio, are not liable to assessment in the suit by Dwight S. Marfield, according to an opinion handed down by Judge Stanley C. Roettinger in the Hamilton County Common Pleas Court, Cincinnati. The suit sought to hold all stockholders of the company and named more defendants than any other action ever filed in the local courts. That there was no contractual relation that would put this case within the provisions of the Federal constitution, Judge Roettinger said was the basis of his decision. Dwight Marfield, representing creditors of the company, sought in the suit to make former stockholders liable for \$500,000 of debts.

Defers Dividend Payment.—The board of directors of the Indianapolis (Ind.) Street Railway at a recent meeting voted to defer the payment of the usual quarterly dividend on the preferred stock of the company, due on June 1. Dr. Henry Jameson, president of the board, explained that the directors felt that "the condition of the company is such that payment of this dividend should be passed." The dividend due on June 1 was 1½ per cent on \$5,000,000 of preferred stock, totaling \$75,000. This is the first time the company has passed a dividend on this stock, Dr. Jameson said. Payment of dividends on certain stock of the company was waived in the reorganization of the Indianapolis Street Railway and the Indianapolis Traction & Terminal Company on the order of the Public Service Commission in 1919.

Traffic and Transportation

Ottumwa Case Unusual

Two Years of Litigation Over the Matter of Fares Leaves Railway Where It Started

The net result of the litigation between the Ottumwa Railway & Light Company, Ottumwa, Iowa, and the city over the matter of fares is that the company finds itself under the recent decision of the Supreme Court of Iowa about where it started a little more than two years ago. This decision was referred to in the *ELECTRIC RAILWAY JOURNAL* for April 16, page 751.

The following summary is from a statement prepared by Cummins, Roemer & Flynn, attorneys, Chicago.

By a provision in its franchise the Ottumwa Railway & Light Company was limited to a maximum rate of 5 cents for street railway fares. In December, 1918, the City Council passed a resolution authorizing the increase of the fare until after the signing of the treaty of peace with Germany, the new rate to be 6 cents. This rate was put into effect, but about April 1, 1919, the City Council rescinded the resolution and attempted to prohibit the company from charging more than 5 cents.

Thereupon suit was brought. A temporary injunction was granted by the trial court which upon motion of the city was dissolved. From the order dissolving the temporary injunction the company appealed to the Supreme Court, where the question discussed was the validity of the franchise limitation of fare in the first instance, it being the contention of the company that the Legislature had never delegated to the city the state function of fixing rates and that therefore the franchise contract limiting the fare to 5 cents was void for want of power in the city to make it. The Supreme Court of Iowa held against this contention in an opinion dated July 10, 1919.

Following this ruling the company filed a petition for a rehearing. This rehearing was granted. After reargument and resubmission of the case a second opinion was handed down on Aug. 9, 1920, in which the contention of the company was upheld that the city was without authority under the statute to make a rate by contract with the railway and that the contract in that regard was void.

Both opinions upheld the broad principle that a city could not contract for rates of a public utility unless its authority so to do had been expressly conferred by the State Legislature, the fixing of rates being a matter of state control, but in the former opinion by a unique theory the judge who wrote the opinion read into the statute the

authority demanded by the general principle laid down. In doing this he overlooked a governing decision by the court and hence the same judge wrote the second opinion above referred to.

When the second opinion was handed down the company naturally concluded that the litigation was ended. The city, however, through its counsel filed a petition for rehearing. This rehearing was granted by the court and the case was set down for argument the third time in April, 1921. In the meantime the personnel of the Iowa court had changed considerably as a result of the election in the fall and the death of one of its members. Before the time came for submission the company asked leave to dismiss the appeal. This was granted by the court with a memorandum to the effect that both the opinions rendered in the case and above referred to were withdrawn.

With a view to determining what would be the proper fare since the reduction in wages, a statement has been prepared by accountants for the city which shows that from June 9, 1920, to March 31, 1921, 28 per cent of rendered in the case were withdrawn.

Omaha Company Wants Skip Stops Continued

The "skip-stop" system, which has been used at Omaha, Neb., since Oct. 1, 1918, was defended before the State Railway Commission in Omaha recently by R. A. Leussler, vice-president and general manager of the Omaha & Council Bluffs Street Railway. The hearing was in response to a petition from patrons who urged the commission to order the company to restore the old system of stopping at every intersection. Cars are stopped at every downtown intersection, and beyond this district the stopping points are indicated on poles by black lettering on a field of yellow.

Mr. Leussler testified that a test made for the year 1919 showed that the operating expenses were reduced \$56,663 by reason of the skip stop, and of that amount \$16,097 was a saving in coal expense. He told the commission that the new system yielded the equivalent of 13,444 additional car hours per year, and that the average speed of cars had been increased from 9.3 to 9.4 miles per hour. He estimated that it would cost \$65,000 more this year to return to the old plan, with no appreciable enhancement of the service.

More rapid and comfortable service and the lessening of accidents were some of the arguments offered in favor of the skip stop. The commission will take the matter under advisement.

Ten-Cent Fare Refused

New Jersey Utility Commission Follows Precedent Established in Public Service Railway Ruling

Eight cents will be the fare in Trenton, N. J., on and after June 27. The present 1-cent transfers will be continued. This was the ruling made on June 20 by the State Board of Public Utility Commissioners on the application of the Trenton & Mercer County Traction Company for a 10-cent fare.

The board held that the present 7-cent rate was "insufficient and unreasonable," but it was not satisfied that a 10-cent rate was just and reasonable and refused to approve that rate.

The board estimated that the increased fare of 1 cent will give a return to the company of nearly 7 per cent on the highest estimate of the value of the company's property and approximately 8 per cent on the lowest estimate.

INCREASE FROM HIGHER FARE \$185,000

The increased revenues under the new rate, the board calculated, will be approximately \$195,000 additional, and deducting about \$10,000 for the extra franchise tax which must be paid on the increased gross receipts, the total increase from the higher fare will be \$185,000. This added to \$158,000, the prospective net revenue of the company from the 7-cent fare, would total \$343,000 the entire net income.

If a 10-cent fare should be charged and the number of passengers estimated by the company should be carried, the board pointed out, the return would be more than the company was fairly entitled to. On the other hand, however, if the result of such fare should materially curtail the use of the trolleys, the value of the service would be impaired and lessened to the public and the company might not obtain more revenue than would accrue under an 8-cent fare.

The Board of Public Utility Commissioners took into consideration not only the Ford, Bacon & Davis report, but also the valuation heretofore fixed by the board in its report of Dec. 13, 1915, and Dec. 26, 1919. The valuation in the latter appraisal was \$3,918,011, including working capital of \$100,000.

VARIOUS APPRAISALS CONSIDERED BY BOARD

The appraisal of 1915 totaled \$4,254,657, while the Ford, Bacon & Davis appraisal based upon pre-war costs was \$4,334,192. In addition there was a valuation of \$4,875,000 made by J. G. White & Company in a former proceeding, in which war time prices were recognized. The Ford, Bacon & Davis report, the board said, however, expressed a conclusion, not based upon actual costs, that the value of the property taking into consideration pre-war prices, war prices and post-war prices, would be in the neighborhood of \$5,000,000. The board stated that due consideration was given to all these appraisals.

Jitney Procedure Announced

New Jersey Commission Lays Down General Conditions Under Which It Will Grant Permits

The State Public Utilities Commission of New Jersey in a recent decision announces that jitney service is accepted by the board as a legislative authorized method of transportation, enjoying the same sanction of law with electric railways. In all future applications for licenses by jitney operators, the board announced it will proceed on the theory that the Legislature deemed jitney service proper in that it refused to curtail the use of such transportation and because it decided to give jitneys the authority and sanction of law in the same manner as any other system of transportation. The board held, however, that municipal licenses granted must have the approval of the commission before they are valid. Attempts to operate under municipal licenses, without the board's approval, are illegal. The Public Service Railway will probably appeal to the Supreme Court for a review of the decision.

The board's finding in part is as follows:

There are, therefore, in many cities of the state two systems of street transportation: the electric railway and the jitney, recognized by and enjoying the equal sanction of the law. Indeed, if either system can be said to be favored by the Legislature it would seem to be the jitney because while the Legislature has placed all street railways under the jurisdiction of this board it has expressly refused to place jitneys licensed before March 15 of this year and operated over their April 6 routes, by limiting its power of regulation solely to such as should be licensed after March 15.

The board granted permission to C. A. Becker to operate a bus line on the Newark-West Orange line and at the same time refused to approve twenty-six applications for licenses granted by Hoboken to operate on Washington Street between Fourteenth and the Hudson and Manhattan Tube tunnel, a distance of approximately a mile. In denying the Hoboken license the board said:

We are of the opinion the necessity does not require additional jitney service as the same will not add to the comfort and convenience of the riders, but on the contrary will add to the inconvenience of others who have to use the streets or cross the same.

There are 125 jitneys in operation on this Hoboken route.

The commission also announced that because the Atlantic Coast Electric Railway operating in Asbury Park and other seashore towns has recently materially improved its service it would issue no licenses for jitneys to run parallel with the trolley lines.

Bonus Plan for Trainmen Abandoned

The Dallas (Tex.) Railway has abandoned its plan of bonus pay for trainmen, as it did not prove satisfactory, according to Richard Meriwether, vice-president and general manager, who inaugurated the scheme as an inducement to careful operation. The scheme of reward provided that a monthly bonus of 2 cents an hour for all time worked was to be paid to motormen if they

were free from any accident during the month. The conductor received a corresponding amount if his record was clear from any complaint arising out of his contact with the public.

The plan was installed early in 1920 and was continued during a large part of the year. It followed an earlier plan whereby the company divided any saving in the cost of accident claims under 4.5 per cent of the gross receipts, in the proportion of 75 per cent to the men and 25 per cent to the company. This reward was paid only at the end of the year and was distributed among the men according to the number of hours' work they had put in during the year. This did not prove to stimulate any great improvement in the number of accidents, and it was abandoned for the plan of monthly payment of a fixed amount, also abandoned.

Dallas Asks for Continuance of Six-Cent Rate

The Dallas (Tex.) Railway, having lost its fight for a 7-cent fare, has filed with the City Commission an application for a continuance of the 6-cent fare for another year. The 6-cent fare was granted on June 25, 1920, for a period of one year, with a proviso that if the company's finances were in such shape at the end of that period that it could not operate on a 5-cent fare and show earnings of 7 per cent as provided in the franchise, the 6-cent fare would be continued for another year at the request of the company. The City Commission is expected to approve the application before June 25 so that the company can continue on the 6-cent fare basis without interruption.

The application of the company for a continuance of the 6-cent fare represents that the company can not reduce fares to 5 cents at this time and continue to operate and maintain the present standard of service. It is set forth that the present 6-cent fare was granted by the City Commission as a relief measure during negotiations for a service-at-cost franchise, but that such negotiations were called off without material result having been obtained. The traction company then sought a 7-cent fare on the ground that a 7-cent fare charge was necessary in order that a return of 7 per cent on the agreed valuation might be shown. The application for a 7-cent fare was denied by the City Commission on May 2, 1921.

Richard Meriwether, vice-president and general manager, who signed the application of the traction company, declares that unless there is a further reduction in operating costs or unless the company is relieved of certain burdens now imposed on it by the city, such as bearing the cost of paving between its tracks, officials feel that they will not be able to keep pace with the growing requirements of Dallas. He says the company probably will continue to show its authorized return of 7 per cent but that it will not be able to rehabilitate its credit.

Fares to Be Reduced

Cincinnati, by Deferring Certain Franchise Payments, Will Benefit Almost Immediately

Amendments to the ordinance governing the operation of the Cincinnati (Ohio) Traction Company were passed during the week ended June 18 by the City Council, assuring the public of a decrease in fares on Aug. 1 and Nov. 1 of this year. The fares will be reduced one-half cent on each of the dates mentioned. The amendments were passed by twenty-seven votes to three.

The session of Council at which the amendments were adopted was marked by frequent squabbles arising over the proposed action of Council in passing the amended ordinance. Several Councilmen who voiced bitter opposition to the new plan at a public hearing several days prior again took the floor against the measure.

Before the amended ordinance was voted on, Saul Zielonka, City Solicitor, explained the workings of the ordinance, showing how the amendments will effect a great saving. After Mayor John Galvin signed the ordinance he issued a brief statement saying that he did so because he wanted fares to come down as soon as possible.

A letter of opposition to the new plan sent to the Council committee on street railways by the Chamber of Commerce was ordered received and filed.

William Jerome Kuertz, Director of Street Railways, said that the new ordinance would pave the way to lower fares with the help of a readjustment of economic conditions.

The ordinance is entitled as follows:

To provide for the reduction of the cost of carrying passengers on the street railway system of Cincinnati by the suspension of certain payments and accruals provided to be made by Ordinance No. 253-1918 of the City of Cincinnati, and to provide a reduced rate of fare for school children in said city.

The amendments to the original service-at-cost grant have been explained by Mr. Kuertz. He says that the savings made through wage reductions, lower coal prices and the new power contract with the Union Gas & Electric Company in September would not be noticeable in reduced fares for several years under the present franchise. He pointed out that the Cincinnati Traction Company has been unable to pay its accumulated deficits and scarcely has earned enough for its capital charges. It was contended by him that the proposed ordinance provided a change which would permit the public to get the immediate benefits of present reductions in operating costs without suffering any loss of franchise tax, but merely deferring that obligation.

Line Resumed and Fare Cut.—The Revere Beach prepayment loop of the Eastern Massachusetts Street Railway, opposite the State Bath House, Boston, Mass., has been reopened for the summer season. The fare between Scollay Square and Revere Beach has been reduced from 15 to 10 cents on the Bay State lines by way of Chelsea.

Seven Cents Desired

Richmond Railway Wants This Rate Pending Permanent Franchise Settlement

In support of the request of the Virginia Railway & Power Company for an increased fare in Richmond from 6 to 7 cents, President Thomas S. Wheelwright has given to the business organizations of the city a statement of the company's affairs showing that there are held by Richmond people 22,284 of the 85,000 shares of preferred stock, or more than 26 per cent, and 35,099 shares of the 120,000 shares of common stock, or 29 per cent.

The historic value of the Richmond street railway property made by Stone & Webster, that is to say, money actually invested, plus interest, less any returns paid to investors in the past 25 years, amounts to... \$20,249,400

The present value of the Richmond street railway property now in the service of the public, according to the inventory and appraisal of Stone & Webster, is 12,488,841

Showing an actual shrinkage in value of \$7,760,559

The securities allotted to the Richmond street railways on the basis of its present value are as follows:

Bonds	\$6,725,366
Preferred stock	2,671,800
Common stock	3,317,708

Total

The interest on these bonds at 5 per cent and 1 per cent sinking fund amount to..... \$403,522

Under the 6-cent fare the company contends it is now earning only 1.3 per cent, or at the rate of..... 86,959

Leaving a deficit on account of bond interest of..... \$316,563

In his statement, Mr. Wheelwright says:

We estimate that allowing for the actual falling-off in travel we will haul about 40,000,000 revenue passengers under the 7-cent fare which would give a gross increase in revenue of \$400,000, 10 per cent of which will have to be paid to the city as a franchise or license tax, leaving an estimated balance of \$360,000, from which will have to be deducted the difference between the 7-cent fare and school ticket fares at 2½ cents, which, based on last year's figures, will amount to \$45,000, leaving a net estimated balance of \$315,000.

Hence you will see that if the 7-cent fare is granted it is only an emergency measure pending the working out of a franchise which will recognize the value of the property used in the railway service and fix such fares from time to time as will insure the integrity of the investment, thereby securing a basis for credit upon which further capital investment may be obtained.

Bus Measure Upheld

The constitutionality of Toledo's bus regulatory ordinance has been upheld by Common Pleas Judge Curtice Johnson following arguments by bus owners and the city attorneys.

The temporary injunction against the enforcement of the ordinance will stand for a few days, however, to allow an appeal to be taken before the County Appellate Court. It is believed that this appeal will be heard soon so that the ordinance may be enforced if upheld.

William Powlesland, bus owner, who brought the suit against the city, claims that the bonds required make operation of buses prohibitive. At law it was claimed that the ordinance was

invalid because it contained more than one subject matter.

"The ordinance, I find," declared Judge Johnson, "contains but one subject matter, that of the regulation of buses."

It is said that the buses have been taking away approximately \$700 a day from the railway by operating on the best paying lines at peak hours and for short hauls only.

Stage Lines Cannot Give Local Service

Operative rights of automobile transportation companies engaged in business before the regulatory statute of May, 1917, are announced in a decision by the California State Railroad Commission of June 10, 1921.

The commission holds the right of regulation rests in the commission, and extensions of service are subject to permit. This applies particularly to the inauguration of local service. This decision was rendered in the case of the Crown Stages Company against the White bus line and the White stage line. In this case the commission ordered the White bus line and the White stage line to desist operating as a transportation company between Santa Ana and Anaheim and intermediate points. The defendant companies hold an operative right for a through service between Los Angeles and San Diego, and because of this claimed the right to operate a local service between Santa Ana and Anaheim, which are way points, without obtaining from the commission a certificate of public convenience.

The commission holds that, notwithstanding the defendant companies were operating before the statute of 1917, they are subject to regulation by the commission. The decision says:

The only basis for any distinction between transportation companies operating prior to May 1, 1917, and those which commenced subsequent to that time is in the manner of creation of their operative rights.

The commission in its decision points out and holds that the act in effect declared that such operations as were actually being carried on in good faith on May 1, 1917, would be recognized as a lawful right to be exercised by those then in enjoyment. Every subsequent deviation from or change in such operations must be under the approval and authorization of the regulatory body.

The decision also lays down the rule that a company would have the right to put on local service to the extent only that it was its duty to render it as the company had held itself out to do prior to May 1, 1917.

This ruling will affect a number of companies operating under rights acquired before May 1, 1917. The commission holds that all companies originally operating between through points must obtain a certificate of public convenience and necessity in order to initiate local service.

Transportation News Notes

Fares Must Go Up in Findlay.—The fare at Findlay, Ohio, will be increased to 10 cents beginning July 1. The lines there are operated by the Toledo, Bowling Green & Southern Traction Company, under the service-at-cost plan and have been showing a deficit under an 8-cent fare. Riding has shown a decrease each month since the plan was adopted.

Lower Fares in Effect.—The Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., has announced a new fare schedule whereby thirteen tickets will be sold for \$1, heretofore restricted to workmen. It is believed that the lower rates will increase the patronage which decreased after September, 1920, when the 10-cent rate went into effect. This 10-cent rate remains in force for cash fares. The lower rate will be an experiment, the company reserving the right to revoke the order if operation under it is found to be unprofitable.

Jitneys Ruled Off Flint Streets.—In order to eliminate traffic congestion on streets where cars are operated the Flint City Council recently ruled jitneys off streets on car line routes. The ordinance provides that bus operators will have to file with the city clerk a statement on the proposed route, terminals and hours of operation. Approval of the council will be necessary before jitneys can run. Recently the Flint City Council authorized a 6-cent rate after the Detroit United Railway which operates in Flint had asked for a fare readjustment and the elimination of bus competition.

New Rates Filed.—The Pacific Power & Light Company, Astoria, Ore., has filed a new tariff with the Oregon Public Service Commission providing increased fares on the traction lines of the corporation, together with slightly advanced charges for gas. Under a new law enacted at the last legislature, tariffs of this character have to be filed with the public service commission 30 days before becoming effective. If not suspended by the commission before the end of the 30-day period, the rates become operative without a hearing or other formality. For single rides up to the length of the line in either direction, the company has asked that the cash fare be increased from 5 to 7 cents. Ticket books, good for 50 rides up to the length of the lines in either direction have been fixed at \$3, while student ticket books, good for 40 rides up to the length of the lines in either direction have been set out in the tariff at \$1.75. This is an increase from \$2.50 for five-ride ticket books, and \$1.50 for student ticket books,

Personal Mention

New Officers for Southern Public Utilities Company

D. G. Calder, manager of the Charlotte branch of the Southern Public Utilities Company, has been selected treasurer to fill the vacancy caused by the election of E. C. Marshall as president to succeed Z. V. Taylor. A. B. Skelding, of utility fame, now steps into the managership of the property.

Mr. Calder is well equipped to fill his new position, having gained much experience since assuming the managership when the company was formed some years ago. Prior to his services with the Southern Public Utilities he was connected with the Catawba Power Company.

A. B. Skelding, the new manager of the Charlotte branch, is one of the best known utility men in the South. For the past three years he has been assistant to the president of the Carolina Shipyard. For many years prior to his association with the shipyard he was general manager of the Tidewater Power Company. His record of service includes experimental work with Thomas A. Edison and managing railway systems at Knoxville, Tenn.

Life Sketch of "Sam" Riddle

A brief review of the business life of Samuel Riddle and his connections with the Louisville (Ky.) Railway was recently published by a local paper, along with a silhouette of the man. It was said that during the time that Mr. Riddle has been with the railway he has been in practically every department in an executive capacity.

Commission Man Heads Engineers

Harry O. Garman, Indianapolis, Ind., has been elected president of the American Association of Engineers at its annual meeting in Buffalo. The organization has more than 25,000 members. Mr. Garman, who was first vice-president of the association, was nominated by the Indianapolis chapter. He is chief engineer for the Indiana Public Service Commission, with which organization, together with its predecessor, the State Railroad Commission, he has been associated for more than thirteen years. He is a past-president of the Indiana Engineering Society, member of the American Railway Engineering Society, associate member of the American Society of Civil Engineers and associate member of the American Institute of Electrical Engineers. For ten years he was an instructor and associate professor of civil engineering at Purdue University. He formerly was

assistant engineer of the Illinois Central Railroad, and is a director of the City Trust Company, Indianapolis.

New Twin City Vice-President

T. Julian McGill, Westinghouse Man at Chicago, Enters Railway Operating Work

T. Julian McGill has been elected by the board of directors of the Twin City Rapid Transit Company, Minneapolis, Minn., vice-president of that company and underlying companies. Mr. McGill will move to Minneapolis within the next sixty days and will take up actively his duties as vice-president in charge of operation of the Twin City lines.



T. J. MCGILL

Mr. McGill is at present manager of the Westinghouse Company's largest distributing plant in Chicago. He is well known throughout the entire West, more particularly in Minnesota, where from 1903 to 1909 he was manager of the Minneapolis office of the Westinghouse Company, having charge of all the Northwestern States including Montana and a large part of Canada. He has been connected with the Westinghouse Company since 1898. In 1909 he was transferred to Atlanta and in 1914 was made manager for the company in Chicago with jurisdiction previously noted.

It is expected that as vice-president in charge of operation Mr. McGill will take over a large part of the work connected with that department which has previously devolved upon Horace Lowry as president of the company.

The Twin City System is one of the largest of its kind in the country with a wide diversity of interests, its activities even including the operation of steamboat service on Lake Minnetonka. In the system are included 452 miles of line.

Managers and Superintendents Reassigned by Eastern Massachusetts Company

Transfers of managers on the Eastern Massachusetts Street Railway have been ordered by R. B. Stearns, vice-president and general manager, effective on July 6. The changes were brought about as a result of the death of Manager James O. Ellis of the Chelsea District and the resignation of Manager Harrah K. Bennett of the Melrose-Woburn District. They are as follows:

Manager Frank I. Hardy of Salem to manager of Chelsea and Melrose-Woburn Districts.

Superintendent Vard B. Leavitt of Lowell to superintendent of Melrose-Woburn District.

Manager Maurice E. McCormick of Quincy to manager of Salem District.

Charles E. Whalen of Boston Office to superintendent of Lowell District.

Manager Garfield S. Chase of Haverhill to manager of Lawrence District.

Superintendent Francis J. O'Donoghue of Brockton to manager of Haverhill District.

Manager John H. Hayes of Lawrence to manager of Quincy District.

Manager Patrick F. Sheehan of Brockton to manager of Fall River District.

Manager A. J. Boardman of Fall River to manager of Brockton District.

Mr. Devlin's Successor Appointed

Harvey W. Brundige on May 10 took office as president of the California State Railroad Commission, following his election to succeed Frank R. Devlin, who resigned from the commission May 1. Mr. Brundige was appointed to the State Railroad Commission two years ago for a six-year term by Governor William D. Stephens.

During his residence in southern California he has been prominent both in civic affairs and in matters of state importance. He has a national reputation in newspaper circles, having worked for several years in the East before going to California. He formerly was editor of the Los Angeles *Evening Express*. By reason of his experience in commission affairs he is said to be unusually well fitted for the office of president.

The membership of the railroad commission is now composed of H. W. Brundige, Los Angeles; H. D. Loveland, San Francisco; Chester H. Rowell, Fresno; Irving Martin, Stockton, and H. Stanley Benedict, Los Angeles.

Jess Marple, former superintendent of the Moundsville division of the Wheeling (W. Va.) Traction Company, has resumed his old duties after working for some time in Pittsburgh. William A. Smith, who has been acting superintendent of the Moundsville division, has returned to his duties as night dispatcher at Tenth and Main Streets. William Meyers, who has been acting dispatcher, has resumed his duties as trainman.

Clarence J. Shearn, Ex-Supreme Court Justice, has been appointed special counsel to assist the New York Transit Commission. Mr. Shearn, experienced in municipal and railroad law, will guide the commission in outlining a new plan for transit reorganization.

Ivan Bowen, Mankato, Minn., has been appointed by Governor J. A. O. Preus to the Minnesota Railroad & Warehouse Commission to succeed the late Judge Ira B. Mills. Thus Mr. Bowen becomes a commissioner at the beginning of the action by the electric railways of the State to have valuations of their properties made on which the commission is to base its order for rates which the various companies may charge for fares.

Howard T. Kingsbury, attorney in New York City, has been appointed counsel to the Transit Commission, in place of Louis C. White, who has resigned to enter private practice. Mr. Kingsbury was formerly a special assistant to the United States attorney-general in the prosecution of anti-trust cases in 1914. He is a graduate of Yale University and New York Law School and at present is judge advocate general of the New York State Guard, with the rank of lieutenant-colonel.

W. R. Williams, secretary of the California Railroad Commission's office at San Francisco, resigned on May 11 to become examiner for the commission and the head of the Los Angeles office. He will be succeeded as secretary by Colonel H. G. Mathewson, commander of the 40th Railroad Artillery Regiment in the World War, former commander of the American Legion in California and at present assistant secretary of the commission. Mr. Williams succeeds as head of the commission's office in Los Angeles Miss Converse, whose resignation was noted in the issue of this paper for May 7.

R. E. Luellen, safety engineer, Union Traction Company of Indiana, Anderson, Ind., has been appointed chairman of the bulletin committee, electric railway section of the National Safety Council. This committee is charged with the work of collecting data from the member companies from which to prepare the weekly bulletins distributed by the council. Mr. Luellen is editor of the magazine *Safety* published by the Union Traction Company of Indiana and is in charge of the company's power saving department, which is engaged in a very successful campaign of investigating and reducing the power consumption of its cars.

Frank M. Kemp, who has been connected with the general offices of the Gary (Ind.) Street Railway since March, 1912, and who has been chief clerk for the last five or six years, was appointed on May 22 as treasurer of the company, and also of the Gary and Valparaiso Railway, to succeed the late Lewis E. Woodward. Mr. Kemp, in addition to his duties as treasurer of both traction companies, will discharge the duties of chief clerk until the latter position

shall have been filled by appointment. The Gary Street Railway and the Gary and Valparaiso interurban system are operated by the same management, and for that reason Mr. Kemp became treasurer of both systems. The appointment was made today by President Charles W. Chase, who is president of both companies.

F. J. Foote Advanced

Experienced Master Mechanic Now
Superintendent of Power
on Ohio Electric

F. J. Foote who for the past twelve years has been connected with the Ohio Electric Railway, Cincinnati, Ohio, as master mechanic in charge of car equipment and shops, has been promoted to the position of superintendent of power. He has been given, in addition to his former duties, the supervision of the power houses and substations on those properties of the system known as the Indianapolis,



F. J. FOOTE

Columbus & Eastern Traction Company and the Columbus, Newark & Zanesville Traction Company. This includes two large power houses and fourteen substations.

Mr. Foote is well qualified for the position of superintendent of power, being a graduate of the University of Illinois and a post graduate of the University of Wisconsin, where he received the degree of electrical engineer in 1902. He has also had wide experience in power station work, having held the position of electrical engineer on heavy construction work for both the Allis-Chalmers Company and the Westinghouse Electric & Manufacturing Company and was also for several years chief operating engineer for a large manufacturing company.

Before taking up his technical studies Mr. Foote learned the trade of machinist and worked in various shops for several years. He has found that the hard knocks and practical experience in the shop have been of great value to him ever since. Mr. Foote's headquarters are at Springfield, Ohio.

Obituary

Charles H. Edmunds, a member of the legal department of the Philadelphia (Pa.) Rapid Transit Company, died on May 6. He was also a member of the Board of Education of Philadelphia and a prominent attorney of that city. He was born on Nov. 26, 1862.

George C. Hoffman, who had been in the employ of the Third Avenue line of the Interborough Rapid Transit, New York, for nearly forty-one years, died at the age of sixty-two. During his railway career he had held positions as a train starter, dispatcher and day trainmaster of the Eastern Division.

Thomas S. Wood, for twenty-seven years resident counsel for the Duluth (Minn.) Street Railway Company and attorney for several railroads and other corporations, died suddenly of heart failure on May 18 at the age of sixty-three. He was an intimate friend of William H. Taft, former President.

T. E. Gatehouse, who for nearly forty years was editor and part proprietor of the *Electrical Review*, London, died several weeks ago in his sixty-seventh year. In his earlier days he was engaged in submarine-cable and electric-lighting work, and in 1882 he became editor of the *Electrical Review*, which is one of the most important technical publications in Great Britain. He was a member of the Institution of Civil Engineers, of the Institution of Electrical Engineers and a fellow of the Royal Society of Engineers. His death has caused a gap in British electric circles and in technical journalism.

Thousands Pay Final Tribute to Master Interurban Builder

Hundreds of railway and electric light men from all over Texas attended the funeral in Dallas, Tex., of Col. J. F. Strickland, whose death was noted in the *ELECTRIC RAILWAY JOURNAL* recently. Not only did business men from other cities come to pay tribute to his memory but thousands formed in a funeral cortege to show the high esteem in which the master interurban builder was held. Since his death telegrams and messages of condolence have been pouring in from utility operators and financiers located in all parts of the country.

Col. Strickland's death was caused by heart failure. He had been suffering with a weak heart for several months and had planned to start on a long vacation beginning May 23, in the hope of regaining his strength. Physicians say his heart trouble resulted from overwork. He was an indefatigable worker and had been at his office early and late recently on account of the application to city commissioners for an increased fare.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Still Lower Prices on Scrap Iron and Steel

Pig Iron and Sheet Prices Show Revisions Downward in Market About 25 per Cent in Production

During the past week, while there have been only few price revisions of new steel and iron products, there have been several items in the scrap lists which have succumbed to lower prices. Basic pig iron, delivered Pittsburgh, is off 50 cents to \$22.96; foundry in Chicago, delivered, is off the same amount to \$21.70; No. 2 foundry, Cleveland, is off nearly \$1 to \$23.50, and various pig irons, f.o.b. furnace, Buffalo, are off from 50 cents to \$2. There is a \$5 lower market in sheets, quotations on black sheets, Pittsburgh, being obtainable at 3.75 cents and galvanized at 4.75 cents. The upper limits are 4 and 5 cents respectively. The range on blue annealed is 2.85 cents to 3.10 cents. Activity in the steel industry is extremely low with little change from the average rate of operation of 25 per cent noted last week.

The scrap metals show several reductions. Old iron car wheels are \$1 lower in Pittsburgh to \$14-15 in gross tons, delivered; 50 cents lower in Chicago to \$13-13.50 and \$1.50 lower in New York to \$12.50-13. Steel car axles in Pittsburgh are 50 cents off to \$14.50-15.50; steel railroad axles in New York are \$1 lower to \$10.50-11; in Chicago the drop is 50 cents to \$13-13.50. Rerolling steel rails in New York show a 50-cent reduction to \$9.50-10; in Philadelphia the result is \$1 off to \$12.50-13. Old iron rails at Chicago are \$1 lower to \$16-16.50. Frogs, switches and guards are 25 cents lower in Chicago to \$10.75-11.25, and old short steel rails there are off 50 cents to \$12-12.50. Steel springs in Chicago are also 50 cents lower to \$12-12.50. In this scrap market, too, buying is listless.

Prompt Deliveries of Motor-Driven Track Grinders

Good Demand of First Quarter Reported to Have Shown a Decrease Recently—Some Repair Buying

Buying of motor-driven track grinders is not large at the present time, manufacturers report. One of the largest producers does say that demand was very good during the first quarter and well into the second, but recently it has shown a marked falling off. On the whole, makers of this class of equipment do not seem pessimistic, for some report that considering present abnormal business conditions the volume of orders received is good; others state that

they would not expect a large sale of new equipment just now. A few inquiries are being received from steam roads but not many orders. A feature of the present market is the number of orders received in certain quarters for repair parts to enable electric lines to put their track grinding equipment into shape.

Shipments are exceedingly prompt in general, some producers being able to ship motor-driven grinders in one week or even less, and others being able to deliver up to three machines at one time within ten days of receipt of order. Of course this varies depending upon the electrical specifications and capacity of the tool. Raw material is in plentiful supply and about the only limiting factor in deliveries is the time of manufacture.

Raw material in this field has been reduced from 20 to 50 per cent, it is stated, but the price situation on the finished product is not uniform. One producer, for instance, has reduced prices 10 per cent, while another has made no cut, it is stated, because prices were not boosted during the war. Working forces have been reduced as much as one-third and wages are down about 12 per cent with some manufacturers, while several others report no reduction in wages as yet, though conditions, it is stated, make it seem as though this will be necessary.

Germans Competing for Railway Business

That recent activity in Germany along certain lines of steel manufacture such as rails and car wheels has offered competition to American producers has been previously noted in these columns. Germany plans to make further bids for wresting business away from foreign competitors, however, for according to a report of the Guaranty Trust Company of New York, just issued, the government has reduced export duties on pig iron, machine parts, rails, sleepers, axles, points, springs and ball bearings among other products. The new rate is 1 per cent, compared with a tax of 3 to 10 per cent formerly.

In addition the report states that the Linke-Hofman Company at Breslau, one of the leading German manufacturers of railway stock, has just completed large orders for the Belgian, Czechoslovakian and Norwegian governments. The manufacturers of railway supplies in Germany report a veritable glut of orders, especially from South Africa, France and China. The Russian Soviet government has placed a large order in Germany for rails, sleepers and other permanent way materials.

National Pneumatic Company After European Business

President and Vice-President, Soon to Sail, Believe Manufacturers Here Must "Beard Lion in Den"

With the object of stimulating interest abroad in the products of their company, Harold Rowntree, president of the National Pneumatic Company, New York City, and Thomas W. Casey, vice-president, expect to make a business trip to Europe next month. Mr. Rowntree and Mr. Casey will sail on the Olympic, July 16, to be gone about three months. Their itinerary includes London, Paris, Holland, Italy and possibly Madrid. Among the more important properties they will visit are the London underground railway system, the Metropolitan Underground of Paris and the Amsterdam surface lines, the latter of which is already doing business with the National Pneumatic Company.

The most important object in view in making this trip, Mr. Casey states, is to interest the two main underground railway systems of Europe in the American practice of multiple-unit system of train control. A subway is now building in Madrid, Spain, which will offer a possible additional market. It is not the intention to visit Germany at the present time. Second to the institution of this system of train control will be the endeavor to interest railway lines in the company's system of pneumatically operated doors.

Mr. Casey is very optimistic over the prospects for business abroad. At the present time he believes that American manufacturers are sitting by too quietly waiting for both domestic and export business to come to them, when the proper procedure he thinks, is to "beard the lion in his den." "The business is there waiting in Europe, but American producers must go after it and wake up foreign buyers before the three obstacles of exchange rates, tariff and competition will ever be overcome." If the company finds a decided prejudice against products manufactured outside the buyer's own country, it will endeavor to have other countries manufacture under its patents.

Current Prices of Cross-Arms

In connection with the article on buying of cross-arms which appeared in last week's issue mention was made of a 10 per cent drop on yellow pine arms earlier this month. Prices now in effect on these arms, quoted by a representative producer, are given below.

The quotations given cover 75 per

cent heart, long-leaf yellow pine and are made f.o.b. Hattiesburg, Miss. Corresponding prices of McCormick fir arms are also given.

Electric light arms, two-pin, 3 ft. x 3½ in. x 4½ in., less than 1,000 lineal ft., \$28.61 per 100 net, over 1,000 lineal ft., \$25.43; 6 ft. x 3½ in. x 4½ in., six-pin, less than 1,000 lineal ft., \$57.23, over 1,000 lineal ft., \$50.87; N. E. L. A. arms, 5 ft. 7 in. x 3½ x 4½ in., four-pin, less than 1,000 lineal ft., \$64.72, over 1,000 lineal ft., \$57.52; New England arms, 5 ft. 6 in. x 3½ in. x 4½ in., four-pin, less than 1,000 lineal ft., \$57.23, over 1,000 lineal ft., \$50.87. Quotations on the same size arms as above, in the same quantities f.o.b. cars Rutherford, N. J., on McCormick fir are as follows: \$51.09, \$45.41; \$102.18, \$90.83; \$115.56, \$102.72; \$102.18, \$90.83.

Excellent Deliveries on Malleables

Production Down to One-quarter Capacity as Buying Is Flat—Prices from 5 to 25 per Cent Down

Under present conditions of demand delivery of malleable-iron products is only limited by the time required in manufacture. For standard-pattern items this would probably range in the neighborhood of one month. In view of the situation prevailing in the malleable market just one year ago it seems almost incredible that conditions could have exactly reversed in so short a time. Twelve months ago deliveries were anywhere up to a year behind, while at present operation in this field is only about 25 per cent of capacity and new business is very scarce. The automobile trade, one of the large consumers of malleables, has long been flat, and though it shows some improvement now, automobile manufacturers are well stocked with malleable material purchased at higher prices than now prevail. Railroad buying amounts to little or nothing at present and foreign purchasers are not buying in this country. To make the depression seem worse, the industry is undoubtedly "over-factoried" as a result of war-time expansion.

Prices have followed the pig-iron market down, but not nearly to so great an extent because of the labor factor. Valley furnace malleable pig, Pittsburgh, is worth \$23 per ton at present, a drop of more than 50 per cent from the peak. Prices on heavy malleables are estimated to be down from 20 to 25 per cent and more, but on light castings the drop has not been great, being only about 5 to 10 per cent. The reason for this difference is the increased unit cost on the small items due to handling, labor and other charges. Wages are down about 20 per cent, it is stated.

At the present time word has already gone out in the trade of a further reduction in the price of malleables to be made on July 1 amounting to 10 per cent. There seems little hope of this bringing about a stronger volume of buying, very soon, however.

Wood Tie Demand Not Responding to Low Prices

Existing High-Priced Contracts Which Expire July 1 Retard Buying—Water Freight Rates Down

Although producers state that the present is a favorable time to buy wood ties, and prices are down to a level that even buyers admit is about bottom, demand has shown little or no improvement. Current buying is for spot shipments and in much smaller quantities than usual, as it merely covers imperative maintenance needs. Some producers are optimistic that the wood tie business will pick up late this summer, but others can see no activity ahead this year.

Since before the war the roadbed maintenance needs of railroads have piled up and that there is a good future market most people admit. The unknown factor is the extent to which roads throughout the country are stocked with ties, as reports differ on this. If one large steam railroad in the East is a criterion then stocks of ties awaiting use are large, but on the other hand some producers believe they are small in general. Contracts for ties delivered along the right-of-way will not run out until July 1 in a number of instances, and this of course has retarded buying as existing contracts were placed at the high prices of last year. It is these ties, purchased to cover forward needs while deliveries were running long, that represent existing stock in certain quarters.

Producers have decreased production materially, in fact cuttings are made to replace surplus and little else and stocks are under normal too, but at the same time competition is very keen and immediate deliveries are made in general. Prices, as stated before, are well down. A hewn, yellow-pine, sap tie, 8 ft. x 6 in. x 8 in. that sold delivered in New York harbor for \$1.65 each at the peak price during the last half of 1920 now brings 95 cents each, a drop of 42 per cent. This reduction is in large part due to the decrease in water freight rates, as most of the Southern pine ties are shipped by water. The present water freight rate on ties shipped to New York in a representative instance is 35 cents each plus a 3-cent tax. This represents a 36 per cent cut from the peak rate of 55 cents and 3 cents tax.

Possible Electric Project for Asia Minor

The National Assembly of the Angora government, according to a report from Assistant Trade Commissioner Gillespie at Constantinople, has authorized the construction of a railway from Sivas to Samsun on the Black Sea. It is quite possible that sufficient water power may be developed from the Kizil Irmak River to permit the electrification of this railroad, which will be less than 200 km. in length. No equipment has been purchased nor has contract for construction been placed.

Rolling Stock

Orleans-Kenner Electric Railway Company, New Orleans, La., has placed in operation one 35-ft. combined passenger and freight-carrying interurban car with a seating capacity of forty-eight persons. The car was built at the company's own shops and completed in thirty days' time, believed to be a record for car construction in the South.

Pittsburgh (Pa.) Railways, mentioned in the Nov. 6, 1920, issue as purchasing twenty-five new double-truck cars, has placed the first of these cars in service. The remainder will follow at the rate of four or five a week, and delivery of the entire number will be completed by July 15, it is expected. The cars, which cost about \$14,400 each, are the product of the Standard Steel Car Company, Pittsburgh, Pa., being equipped with Westinghouse electrical apparatus and air-brakes. They were purchased out of the general earnings of the company.

Recent Incorporations

Depew & Lancaster Railway, Lancaster, N. Y.—The Depew & Lancaster Railway, Lancaster, N. Y., has been incorporated by J. J. and E. J. Lenahan and P. Fitzpatrick. The company is capitalized at \$200,000 and proposes to operate an interurban electric line from Lancaster to Cheektowaga. The company is represented by T. C. Burke, Marine National Bank Building, Buffalo. This is the successor company to the Buffalo & Depew Railway sold some months ago.

Track and Roadway

Morris County Traction Company, Morristown, N. J.—The Morris County Traction Company is laying new steel rails and new ties and removing the line from the middle to the side of the streets through Wharton, N. J.

Cleveland (Ohio) Railway. — The Cleveland Railway is planning to build 25 miles of new track this summer to replace existing construction. Of this amount, approximately 9 miles have been completed to date.

Tulsa-Sapulpa (Okla.) Interurban Railway.—The Tulsa-Sapulpa Interurban Railway, controlled by the Oklahoma Union Railway, has announced that it will extend its electric line from Keifer to Okmulgee before the end of the year. The extension has been talked of for some time, and will pass through Mounds and Beggs and the rich Beggs oil district adjacent to Okmulgee.

Windsor, Ont.—The Windsor City Council on June 14 authorized the expenditure of \$900,000 for improvement of the local street railway system, which is operated by the Hydro-Electric Power Commission of Ontario.

Toronto (Ont.) Railway.—The Toronto City Council, at a meeting on June 14, sanctioned a credit of \$7,000,000 for rehabilitation, extensions and equipment for the Toronto Railway system.

Portland Railway, Light & Power Company, Portland, Ore.—A communication demanding that the Public Service Commission of Oregon compel the Portland Railway, Light & Power Company to make the improvements in the maintenance and repair of its tracks which were promised at the time that an increase from 6 to 8 cents in fare was granted was forwarded to Salem recently. It is claimed that the city has failed by a total of \$750,976 to keep its implied promise.

Dallas (Tex.) Railway.—The Dallas Railway has no funds with which to lay tracks on St. Paul from Elm to Commerce Street, necessary to make possible the rerouting of the Harwood-Oak Lawn cars to eliminate the "goose-neck" routing down McKinley Avenue and Lamar Street. To lay tracks on St. Paul from Elm to Commerce would cost \$100,000, according to engineers of the traction company. The new line on Masten Street will not be used, at least for the present, except for a distance of one block, the San Jacinto line being rerouted to use this portion of the new line.

Tacoma Railway & Power Company, Tacoma, Wash.—The Tacoma Railway & Power Company, according to Manager Richard T. Sullivan, cannot consider the extension of the street car line into the Stevens Street district at its own expense. At a recent meeting of the company officials, city officials, and residents of the district various methods of securing construction of the line were discussed, but no agreement was reached.

Power Houses, Shops and Buildings

United Railways, St. Louis, Mo.—The United Railways is considering putting in operation automatic substations for city use. The total capacity will be 8,000 kw.

Public Service Railway, Newark, N. J.—The Public Service Railway is building a new terminal at the entrance of Clementon Park, Camden County. Double Tracks are being laid on the terminus to give better service, and the building of a ticket office will begin soon. The company has placed a scissors cross-over at the Berlin road crossing so cars can be switched from one division to the other.

Cleveland (Ohio) Railway.—The Cleveland Railway is making a study of its entire power distribution system looking to complete revision of the feeder system. This study is being made partly to determine whether there is any copper not being fully used, and preparatory to the change in the power supply system which is going forward with the installation of automatic substations.

Professional Note

Charles W. McKay, until recently president of the firm of McKay & Sherman of Chicago, has become identified with the American Appraisal Company in the capacity of engineer, Public Utilities Department. Mr. McKay has been engaged in engineering and appraisal work since his graduation from Sibley College of Mechanical Engineering, Cornell University, in 1906. In July, 1906, he entered the employ of the New York & New Jersey Telephone Company (now the New York Telephone Company), and in 1909 he was appointed engineer for the North Brooklyn district, having charge of the preparation of plans and estimating for all outside construction work within the district. In 1911 he was appointed engineer of the Borough of Queens. During the year 1912-13 Mr. McKay was associated with Henry Floy in the capacity of assistant engineer, and in the summer of 1913 he became engineer to the McCall & Clark Company, of New York City. In October, 1913, he became affiliated with McMeen & Miller, Chicago, and later engaged in valuation work for the Central Union Telephone Company, and continued in this capacity until his appointment with the Cooley & Marvin Company as chief appraisal engineer. He later accepted a similar position with L. V. Estes, Inc., of Chicago.

Trade Notes

Frederick C. Horner, for several years transportation engineer of the Packard Motor Car Company of New York, is leaving the Packard Company June 18 to spend two years in Europe in order to make a close study of transportation practice in England, France, Belgium and Germany.

Handlan-Buck Manufacturing Company, St. Louis, Mo., manufacturer of railway supplies, announces the death of its president, A. H. Handlan, on May 28. Mr. Handlan was one of the pioneer railroad lamp and lantern manufacturers in the company's territory, having been in business more than fifty years. His three sons will continue the business as usual.

Barney & Smith Car Company, Dayton, Ohio, according to a recent statement of company officials, expects to receive sufficient orders from the Government of Mexico to justify reopening the plant, contingent upon the recognition of the Obregon government by this country. In this connection Lee Warren James, attorney and representative of the car company and Valentine Winters, receiver, made a trip to Mexico and as a result a number of well-known Mexicans have come to Dayton. Matters have now progressed past the tentative stage and Mr. Winters states that recognition of the Mexican government will mean the reopening of the Dayton car works.

Metal & Thermit Corporation, New York City, in order to handle more satisfactorily its growing detinning business in the West, has constructed and will shortly place in operation in South San Francisco, Cal., a large new plant for the production of detinned billets, in addition to the detinning plants already operated by this company for several years at Chrome, N. J., and East Chicago, Ind. The new plant has also been equipped with a large welding shop containing equipment and facilities for undertaking repairing by the Thermit process. With this new equipment at its disposal the company is well prepared to render service to its Western customers. The new South San Francisco plant will be in charge of E. Kardos, superintendent. The cost of the plant is estimated at about \$800,000. The former offices of the company, located at 329-333 Folsom Street, San Francisco, have been moved to the new location.

Howard R. Gass, for the past seven years senior in the engineering department of the Missouri Pacific Public Service Commission, has been appointed sales engineer for the St. Louis Car Company. During his association with the Missouri Commission Mr. Gass was engaged in the valuation of the properties of a number of important electric railways, also handling accident investigations, grade separation problems, signal and interlocking matters and conducting the annual inspection of steam and electric railways for the commission. Prior to this connection Mr. Gass was engaged in steam railroad construction work, having been in charge of viaduct and subway construction, third division of the Kansas City Terminal Railways, and field engineer in charge of all operations for the Union Depot Bridge & Terminal Company, North Kansas City, Mo., also having been associated with the Big Four, Kansas City Southern, St. Louis & San Francisco, M., K. & T., and other properties located in the Southwest.

New Advertising Literature

Steam Turbines.—Bulletin No. 42,019 of the General Electric Company is on the Curtis Steam Turbines for mechanical drive.

Transformers.—The Enterprise Electric Company, Warren, Ohio, is distributing a four-page pamphlet covering its "Peerless" transformers.

Hoists.—Two recent bits of publication from the Electric Hoist Manufacturers' Association, 165 Broadway, New York City, embody the slogan—"The Strong Arm of Industry." One of these bulletins, "Approved Applications," pictures and describes under 133 headings partial uses to which electric hoists have been applied, while the other one, "Monorail Runway Construction," gives specifications covering standard practice in monorail runway construction, including curves and tables.

PEACOCK SAYS —
*don't leave it
to the fender!*



An effective fender is
good insurance, but—

STOP THOSE WHEELS WITH PEACOCK BRAKES

The fender may succeed in snatching a life from the on-rushing wheels, but the motorman and the claim department would rather *stop those wheels*. That's why they praise the quick stops and perfect control obtained with Peacock Brakes.

Always Ready

No question about being able to use a Peacock Brake in time of emergency. This is a brake which the motorman understands and trusts like an old friend in time of need.



The Peacock Staffless

Always Recognized

No question about recognizing Peacock Brakes. Their unique appearance is familiar to every experienced motorman who has been railroading around the country. Watch for them when you are inspecting other properties.

NATIONAL BRAKE COMPANY

890 Ellicott Square
Buffalo, N. Y.

Bankers and Engineers

Ford, Bacon & Davis

115 BROADWAY, NEW YORK
Detailed Examinations by Experts
REPORTS FOR FINANCING COVERING
Valuation Turnover Rates
Costs Reserves
UTILITIES INDUSTRIALS SHIPPING

THE J. G. WHITE ENGINEERING CORPORATION

Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water
Powers, Gas Plants, Steam and Electric Railroads,
Transmission Systems
43 Exchange Place, New York

STONE & WEBSTER

Incorporated
Design and Construct
STEAM POWER STATIONS
WATER POWER DEVELOPMENTS
TRANSMISSION LINES AND SUBSTATIONS
INDUSTRIAL PLANTS GAS PLANTS
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JOHN A. BEELER

OPERATING, TRAFFIC AND RATE INVESTIGATIONS
SCHEDULES—CONSTRUCTION—VALUATIONS
OPERATION—MANAGEMENT
52 VANDERBILT AVE., NEW YORK

SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
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Consulting Engineer
Appraisals, Reports, Rates, Service Investigation,
Studies on Financial and Physical Rehabilitation
Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

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ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
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ELECTRIC RAILWAY ENGINEER
WORCESTER POLYTECHNIC INSTITUTE
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REPUBLIC ENGINEERS, INC.

CONSULTING AND CONSTRUCTING ENGINEERS
Valuations Reports Investigations
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60 BROADWAY, NEW YORK
CLEVELAND, OHIO YOUNGSTOWN, OHIO
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WALTER JACKSON

Consultant
FARES, BUSES, MOTOR TRUCKS
More revenue from more riders
143 Crary Ave., Mt. Vernon, N. Y.
Address June and July:
13 Ranulf Road, Hampstead, N. W. 2, London, Eng.

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WM. BARCLAY PARSONS H. M. BRINCKERHOFF
EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
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Consultant and Specialist
Energy Measurement
For Electric Railways
Investigations Tests Recommendations
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HEMPHILL & WELLS

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Gardner F. Wells John F. Layng Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

AMERICAN BRIDGE COMPANY

HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes particularly **BRIDGES AND BUILDINGS**

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Specializing in Public Utility Rate Cases
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FLATIRON BUILDING NEW YORK CITY



DAY & ZIMMERMANN, INC.
ENGINEERS

*Design, Construction
Reports, Valuations, Management*

NEW YORK PHILADELPHIA CHICAGO

The Most Successful Men
in the Electric Railway
Industry read the

**ELECTRIC
RAILWAY JOURNAL**

Every Week

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and
Reports to Bankers and Investors
Security Building, St. Louis, Mo.

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Engineers

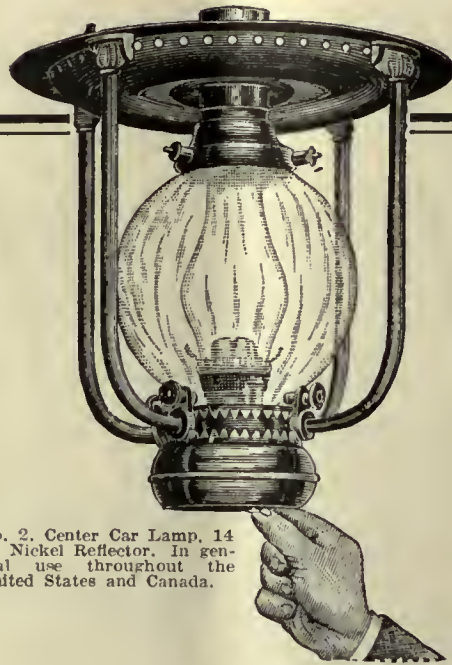
Investigations, Reports, Design and Supervision of Construction for Power Development and Transmission; Dams, Reservoirs, Water Supply, Sewerage, Sewage disposal; Specialists in Public Utility Rates and Valuation.

27 Dow Building 25 No. 10 So. Market Sq.
Albany, N. Y. Harrisburg, Pa.
Engineering Laboratory, Voorheesville, N. Y.

THE P. EDWARD WISH SERVICE
DETECTIVES

50 Church St. 131 State St.
NEW YORK BOSTON
Street Railway Inspection

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



No. 2. Center Car Lamp, 14 in. Nickel Reflector. In general use throughout the United States and Canada.

Thirty-two years ago—One of the exhibits in the 1889 Convention Issue

THE BIG EVENT of the ELECTRIC RAILWAY YEAR

The Convention of the
*American Electric Railway
Association*

this year at Atlantic City during
the week of October 3

A FEATURE OF THE BIG EVENT

The exhibit of electric railway
equipment, materials and supplies.

This year bigger and better than
ever before in the advertising
section of the

ELECTRIC RAILWAY JOURNAL

In which the leading manufactur-
ers have exhibited their newest and
best products for more than a gen-
eration. The date of this year's
exhibit or

CONVENTION ISSUE, SEPTEMBER 24, 1921

ELECTRIC RAILWAY JOURNAL, Tenth Avenue at 36th Street, NEW YORK

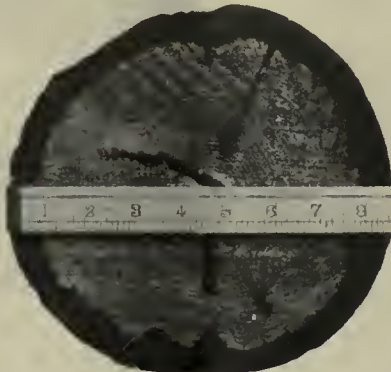
PENETRATION

The Yard Stick That Measures Pole-Life

IN the Butt-Treatment of poles every pole buyer knows that only by guaranteed uniform penetration can he be sure that his poles are insulated against decay. In the P & H Guaranteed Penetration Process, for the first time in the pole industry uniform depth of penetration of the preservative throughout the groundline area is guaranteed. The specifications for the P & H process are not merely a specified method. Specifications for the P & H Guaranteed Penetration Process call for a definite result that must be obtained — $\frac{1}{2}$ inch uni-

form penetration. This result is guaranteed to pole buyers.

This is the practical solution of your greatest pole problems and assures longer life for poles, fewer replacements and lower maintenance costs.



Sample selected at random, showing the uniform one-half inch penetration.

On the end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is countersunk the metal disc shown below. With every shipment of poles the

buyer receives the written guarantee. These are your assurance of guaranteed uniform penetration.

Accept no substitute process of Butt-Treatment.
Insist on the P & H Guaranteed Penetration Process.

Full Particulars on Request

PAGE & HILL CO.
Minneapolis, Minn.

BRANCH OFFICES:

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717 Bryant Bldg., KANSAS CITY, MO.
19 So. La Salle, CHICAGO, ILL.

1111 Carter Bldg., HOUSTON, TEXAS
311 Sumpter Bldg., DALLAS, TEXAS
1416 Starks Bldg., LOUISVILLE, KY.

Originators of the P & H Guaranteed Penetration Process. Producers, manufacturers, and foremost in the Butt-Treatment of Poles.

This disc countersunk on the butt-end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is your assurance of one-half inch penetration.

Butt-Treated
BY
PAGE & HILL CO.
1921
GUARANTEED
One-Half Inch
PENETRATION

Butt-Treated
BY
PAGE & HILL CO.
1921
GUARANTEED
One-Half Inch
PENETRATION

NOW You can relay

TRACK in this condition will eat up the profits of any road in repairs of paving and in repairs and depreciation of rolling stock.



DAYTON

that stretch of bad track with a construction

—that foremost engineers recognize as the most dependable
—that the test of time has proven will outlast all others
—that will save you from \$2,000 to \$6,000 per mile

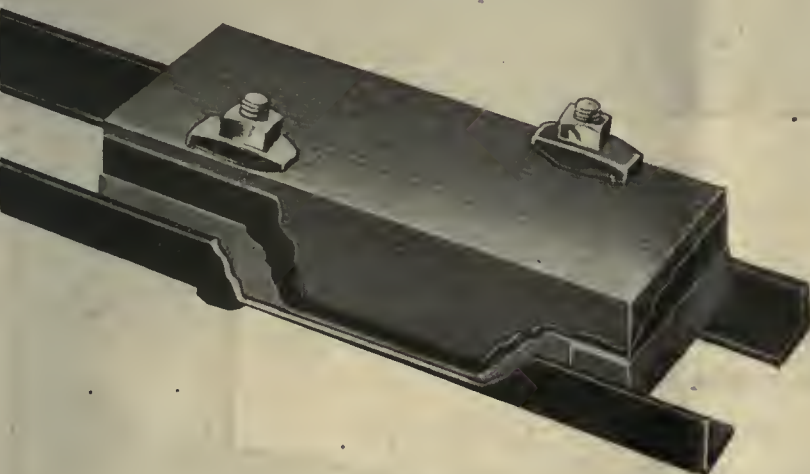
Endorsed by Engineers Engineers everywhere endorse, without question, Dayton Resilient Ties. They now acknowledge that track construction without resiliency will fail, regardless of how heavy the rails or how thick the foundation.

Many roads have adopted Dayton Resilient Ties as their standard for all track construction, because the wood block and bed of asphalt of these ties protect the track foundation from disintegration by absorbing all vibrations and hammer-like blows caused by rolling stock.

Proven by Time Time has proven beyond dispute that Dayton Resilient Ties are built on the only correct principle for track construction. In more than twelve years there is not a single case on record of any track or joint failure where Dayton Resilient Ties have been used. Not only that, but the first track laid on these ties is still apparently as good as the day it was put down. Not one penny has been spent either for up-keep of track or paving repairs, and from all indications it will serve for twelve more years.

Reduce First Cost The first cost of track laid on Dayton Resilient Ties is less per mile than for any other construction. Through their use you will save more than \$2,000 per mile over track laid on wood ties in gravel ballast, and more than \$6,000 per mile over track laid on wood ties in concrete.

Repairs to rolling stock are practically eliminated, because the vibrations are absorbed by the wood block and asphalt in each tie, preventing the crystallization of steel and the chattering and loosening of all car parts.



Mail Coupon for Complete Facts

Let us tell you in detail all about Dayton Resilient Ties. Let us tell you the experiences of other users. Just have your stenographer pin the attached coupon to your letterhead and we will send you our bulletin which shows in detail the construction of Dayton Resilient Ties, how they are installed, and photographs of successful installations.

The Dayton Mechanical Tie Co.
708 Commercial Bldg., Dayton Ohio

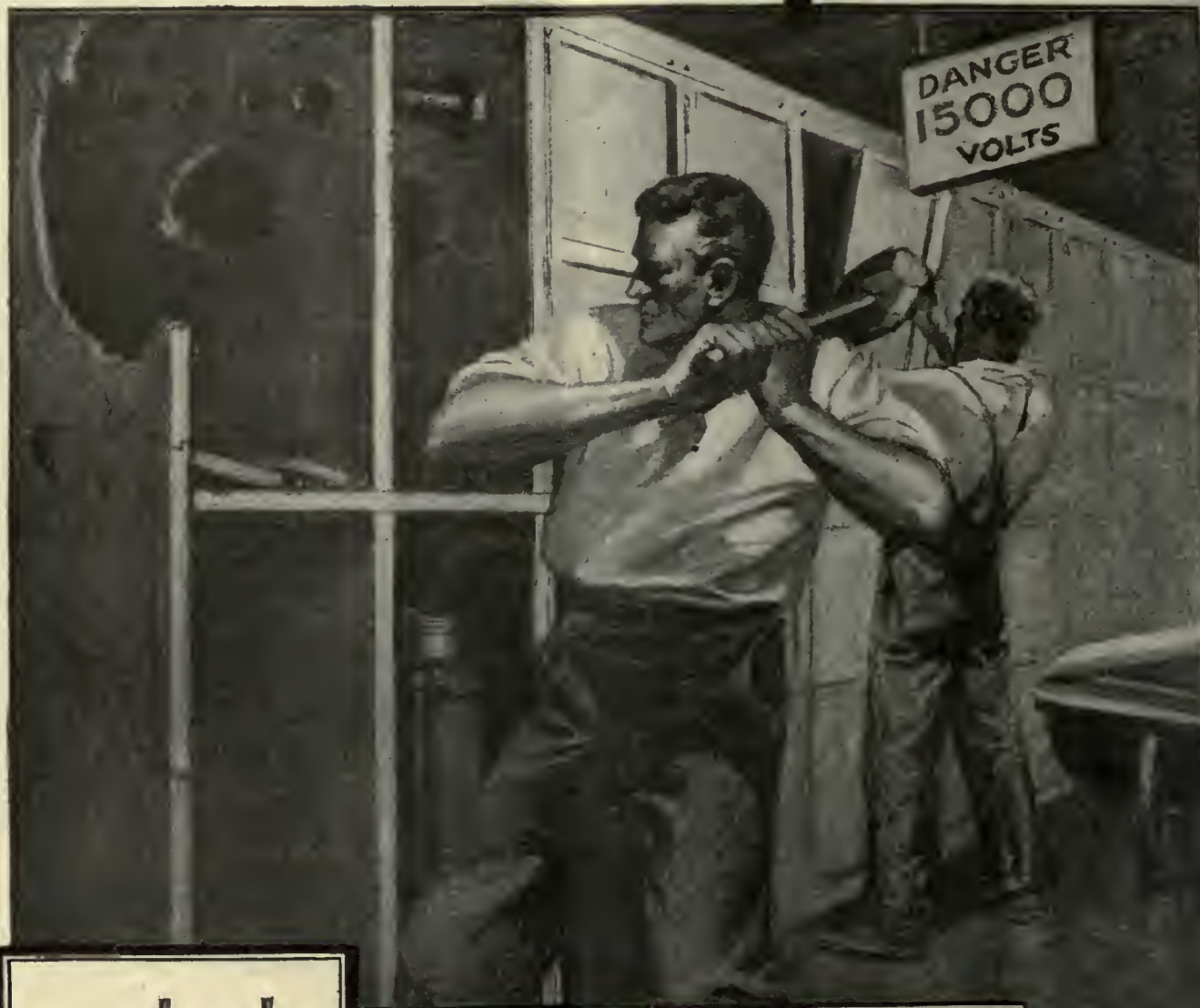
Resilient TIE

PIN TO LETTER

Dayton Mechanical Tie Company
708 Commercial Bldg.,
Dayton, Ohio

Without obligation, please send me full information about your Dayton Resilient Ties.

Save this expense!



F-10 Oil Circuit Breaker

Don't tear down cell structures—yet increase interrupting capacity three to eight times. You can do it by installing CONDIT F-10 Removable Unit Oil Circuit Breakers. Have our specialist analyze your problem.

CONDIT ELECTRICAL MFG. CO.

Manufacturers of Electrical Protective Devices
Boston 27, Mass.

Specifications: Manually or electrically operated; 500, 800 and 1,200 amperes—25,000 volts; interrupting capacity 10,000 amperes—15,000 volts; 1, 2, 3 or 4 pole.

CONDIT



1356 Mechanical Sanders sold the first five months of 1921

When a mechanical device is accepted and installed as standard equipment by the most progressive Electric Railways in the United States it's a true indication that that device is filling a *real want* and performing an important and necessary *service*.

That's the present situation as regards N-L Mechanical Sanders.

Ten large Electric Railways have bought N-L Mechanical Sanders so far in 1921—made them standard equipment on a total of 1356 street cars.

These electric railways regard the purchase of this equipment not as an expense but as an *investment*—an investment that now pays and which will continue to pay real dividends in the form of 100% *protection* from possible accident due to lost air.

As an emergency device the N-L Mechanical Sander used with a hand brake is a real life saver. It is the only combination that can prevent cars from running away when air is lost. As an economical device in regular service N-L Mechanical Sanders prevent the motorman from misapplying his control apparatus, starting the emergency flow of sand and flooding the track with it. N-L Mechanical Sanders apply all the sand you *need* but *no more*. Your cars don't come back empty every night.

The service other Electric Railways have secured thru the use of N-L Mechanical Sanders can be duplicated on your property.

Write today for complete data—without cost or obligation.

The NICHOLS-LINTERN CO.

8404 Lorain Avenue, Cleveland, Ohio

N-L INDICATING SIGNALS MECHANICAL SANDERS



DURADUCT and DURACORD

These two types of electric cable have the quality that their names attempt to imply—DURABILITY. They are built to endure the extremely hard usage of electric railway service, both in car wiring and in shop work.

For Car Wiring — 85% Lighter than Metallic Conduit

Iron conduit is no longer a necessity—it is just another overweight luxury to drag around.

Notice the increasing number of new car orders specifying DURADUCT wiring. The following representative case illustrates why. One of the best-known large city cars built several years ago had all metal conduit wiring weighing 569 lb. If built today, with DURADUCT substituted in exactly the same layout, the weight would be 62.6 lb., a saving of 506.4 lb., or 89%. Other examples range from 85% to 90% saving in weight.

Is not such a saving worth while on your safety car equipment, when light weight is a controlling factor? Specify durable, waterproof and flame-resisting DURADUCT.

For Portable Lamps and Tools — Extreme Flexibility

Dragged across the car-house floor, kinked, trampled underfoot and yanked around generally, DURACORD is built to stand the worst abuse that can be heaped upon a portable cord. It lasts!

TUBULAR WOVEN FABRIC CO., Pawtucket, R. I.



2654 International Registers for the Philadelphia Rapid Transit Co.

Back in 1901 and 1902 the Philadelphia System bought their first International Registers, 350 of the standard type R-7. In 1908 and 1909 the system was completely equipped with the same type of register by a repeat order for 2200 registers. Since then additional orders have brought the total to over 2900 International R-7 registers.

Installation of a ticket fare on this property made necessary the installation of an additional register. The superior service given through many years by the International Type R-7 Register on this road was such that an immediate decision was made to use this register, resulting in the order for 2654 which brings the total of these registers in use on this system to over 5500.

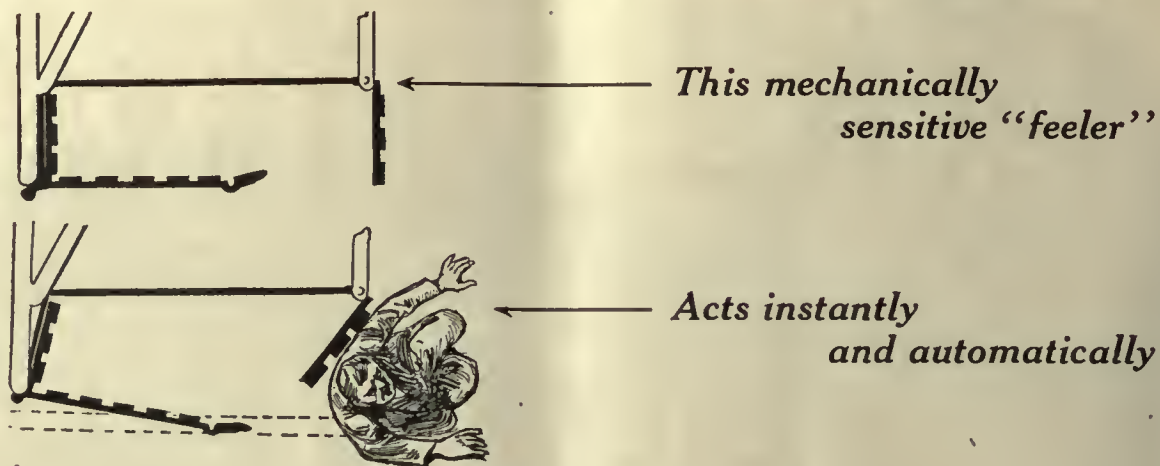
With the new fare collection system, one register will be used for cash fares. The first registers, built in 1901 and 02, are many of them still in service and have proved

entirely satisfactory. Duplication of the entire present equipment by the addition of over 2600 International Registers of the same type is the best possible testimonial of the satisfactory service rendered by International equipment.

Besides the type R-7 used in Philadelphia, we manufacture single and double registers, counters, and car register fittings for all requirements of street railway and city systems.

Exclusive selling agents for
HERREN ENAMEL BADGES

The International Register Co., 15 South Throop Street,
Chicago



That's why practically all users of safety cars, now consider that they are not truly safety cars until equipped with

H-B LIFE GUARDS

Along with the automatic devices to protect the passengers on the car, you need an automatic fender, which functions independently of the car operator at any and all times, to protect the people who are outside the car.

*Making
the Safety Car
Safer
by Installing
H-B Life Guards*



The Consolidated Car Fender Co., Providence, R. I.

General Sales Agent

Wendell & MacDuffie Co., 61 Broadway, N. Y.

"TIGER" BRONZE

AXLE AND

ARMATURE BEARINGS



I will pay you to investigate the money saving possibilities of Tiger Bronze Bearings and to learn more about the engineering service that goes with them. Write today for details.

**Better Service
means lower
ultimate cost**

Buyers of electric railway equipment have learned that low first cost usually means high ultimate cost—and *ultimate cost* is the only true measure of economy.

Take armature bearings for example. The use of low cost, low quality bearings is bound to result in the constant laying up of cars for bearing renewals and for the rewinding of armature coils. High quality bearings eliminate all this expense and save the revenue that's lost while the cars are out of service.

More-Jones "Tiger" Bronze Axle and Armature Bearings are *high quality* bearings. Every day they are helping to reduce maintenance costs on some of the most progressive electric railroads in the country.

MORE-JONES BRASS & METAL CO.
St. Louis, Mo.

TROLLEY WHEELS:
V-K Oilless, M.J. Lubricated
HARPS: V-K Non-Arcing
BEARINGS: "Tiger" Bronze
Axle and Armature
ARMATURE BABBITT
and Similor Products

MORE-JONES

“STANDARD”

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Gear Blanks

Steel Forgings

Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells

Steel Springs



*“The ‘Standard’ Brand on your material
is an assurance of eventual economy.”*



STANDARD STEEL WORKS CO.

GENERAL OFFICES

500 NORTH BROAD ST., PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA
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HOUSTON

MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE



Bates One-Piece Steel Poles with Ornamental Lighting

This installation illustrates one of the possibilities of combining Artistic Bates Poles with ornamental lighting units. The excessive number of poles required where trolley conductors and lighting units are installed on separate poles is not only decidedly inartistic, but is also a needless waste of good material. Of course, it is necessary that an

artistic steel pole be used for such a combination of purposes.

The series lighting conductor is run from pole top to pole top eliminating the use of expensive, troublesome underground cable.

The use of Bates Permanent Steel Poles with ornamental lights represents maximum economy and the utmost in art.

Bates **E**xpanded **S**teel **T**russ **C**o.

208 South La Salle Street
CHICAGO, ILLINOIS

CHEATHAM

Here is what a Railway in the State of Washington has to say about the "CHEATHAM SWITCH" when used in connection with

SAFETY OR ONE-MAN CARS

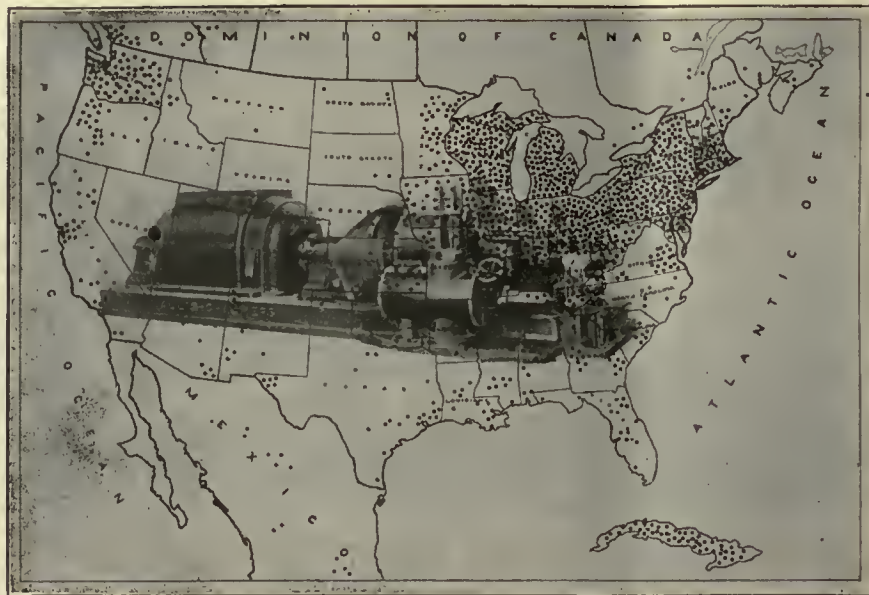
"Relying to your letter, wish to state that we are very much pleased with the CHEATHAM ELECTRIC SWITCHES recently installed. The switches have worked to our satisfaction and have contributed materially in the matter of keeping up schedules, particularly with the one-man cars."

SWITCH

Write

Cheatham Electric Switching Device Co.
4780 Ashbottom Rd., Louisville, Ky.

Allis-Chalmers Steam Turbine and Alternator Units



Each Dot represents an Allis-Chalmers Steam Turbine installation and a satisfied customer.

Satisfied customers are possible only through efficient and uninterrupted service.

Allis-Chalmers Steam Turbines are highly efficient, rugged in construction, built for continuous service.

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.



Keep this line A-MOVING

Passengers held up in the line while someone ahead waits for change will appreciate the more rapid loading when you install a ticket fare system. And you can appreciate yourself what the speeding up of operation will mean to your Company.



GLOBE TICKETS



Designing tickets and transfers has been our business for nearly forty years. Our experience in solving all kinds of ticket problems is at your service. Tickets in convenient strips, rolls or books designed to meet your special conditions whatever they may be. Our P.M. coupon transfer is a positive preventative of those all-day stop-overs. It is also a time-saver. Where every motion counts, elimination of even one punching on every transfer adds up to valuable minutes in the day's work.

GLOBE TICKET COMPANY
112-114 N. 12th St., Philadelphia, Pa.

"Tool Steel" gears
In severest test,
For thirteen years
Have proven best.

Don't Be Satisfied

The world owes its advance to healthy dissatisfaction. Man, not contented with conditions, has striven constantly and still strives to improve these conditions, which has resulted in the wonderful devices, machinery and equipment we have today and will result in the more wonderful devices still to come.

Carnegie Steel Company has constantly endeavored to improve, wherever possible, its methods of manufacture. As a result

Carnegie Steel Gear Blanks

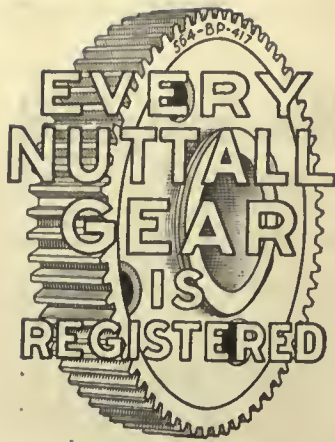
today are manufactured under conditions that make possible the highest quality of product. Every step in their manufacture, from quarry to finished product, is under the careful supervision of experts.

Don't be satisfied with less than the best. Gears cut from Carnegie Blanks will outwear ordinary cast steel gears three or four times. On your next order of gears from your gear cutter, it will pay you to

Specify Carnegie Blanks

Carnegie Steel Company

General Offices: Carnegie Building, Pittsburgh, Pa.



All Westinghouse Electric & Mfg. Co.
District Offices are Sales Representatives
in the United States for Nuttall Electric Railway
and Mine Haulage Products

Heat Treated Gears

The Nuttall Guarantee

We guarantee the material we furnish to be of high grade, free from defects liable to affect the strength of finished work; also, that all machining will be accurate and the finished product in accordance with the specifications.

We will replace any gears developing serious defects in material or not correctly machined.

It is impossible to guarantee gears in terms of specific life, because we have no control over the conditions upon which the life of a gear depends after installation, such as lubrication, protection from grit, correct alignment and centering of shafts.

We do, however, guarantee the life of Nuttall Heat Treated Steel Gearing to exceed the life of untreated, medium carbon cast steel gearing in identical service, as shown by the following ratios

Basis of Comparison:

CS—Standard Cast Steel.....	100
BP—Special Process.....	400
NP—Special Process Cast Steel....	300

We will replace any gears not fulfilling this guarantee, subject to an adjustment based upon the percentage of actual to guaranteed life.

R.D. NUTTALL COMPANY
PITTSBURGH  **PENNSYLVANIA**

Nuttall

Buy Now - Save Now
Safety Car Prices are Lower

Buy now and save from the start—Speed up
schedules and increase earnings—Make your
net help pay first cost—Others do it—You
can—We'll convince you—Inquire!

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

Reg. U. S. Pat. Office
Galvanized Iron and Steel Wire and Strand
Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS

PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 119 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 613 Howard; Seattle, 166 1st Ave. So.

U. S. Electric Contact Signals

for
Single-track block-signal protection
Double-track spacing and clearance signals
Protection at intersections with wyes
Proceed signals in street reconstruction work

United States Electric Signal Co.
West Newton, Mass.

COPPER CLAD STEEL COMPANY

OFFICE AND WORKS: RANKIN, PA. BRADDOCK P. O.
NEW YORK SALES OFFICE: 30 CHURCH STREET, NEW YORK CITY

COPPERWELD Wire—made by the Molten Welding Process
Bare—Weatherproof—Strand.

WESTERN SALES REPRESENTATIVES: STEEL SALES CORPORATION, CHICAGO, ILL.

AETNA INSULATION LINE MATERIAL

Third Roll Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches.

Albert & J. M. Anderson Mfg. Co.
280-93 A Street, Boston, Mass.
Established 1877

Branches—New York, 135 B'way, Philadelphia, 429 Real Estate Trust Bldg. Chicago, 195 So. Dearborn St. London, 48 Milton Street

ANACONDA

Copper Wire
111 W. Washington St., Chicago

ROEBLING

Electrical Wires and Cables

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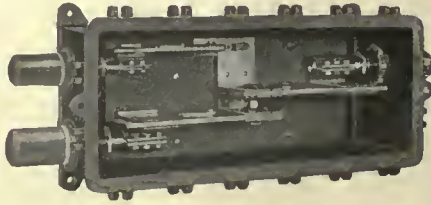
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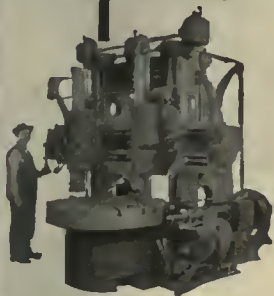
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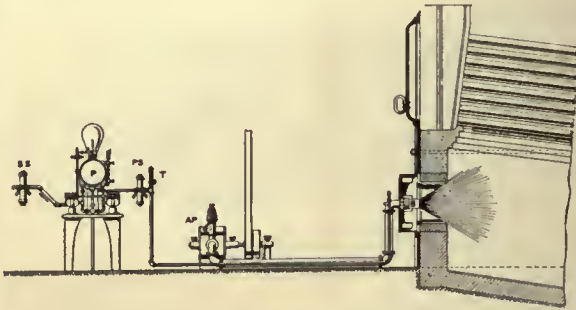
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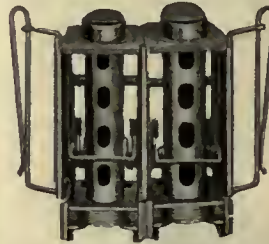


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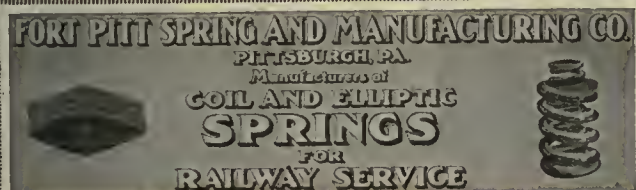


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Electric car heaters—thermostatic control—
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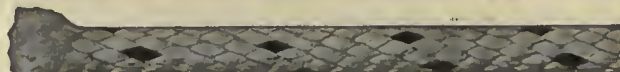
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MAN wanted who can repair armatures, cars and do general shop work. A good position for the right man. P-916, Elec. Ry. Journal, Old Colony Bldg., Chicago.

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CAPABLE technical man of proven executive ability, now employed, seeks opportunity in responsible position where initiative and dependability count and are valued; 19 years' experience in electric railway field; 16 years as executive in charge; thoroughly competent in the design, maintenance and operation of equipment; successful in handling men; experienced in effecting operating economies. PW-910, Elec. Ry. Journal, Real Estate Trust Bldg., Phila.

CAR builder, 14 years' experience as foreman in car construction and repairing. Can handle men and install efficiency methods for obtaining maximum production at minimum cost. PW-908, Elec. Ry. Journal, Old Colony Bldg., Chicago.

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1—480-hp., 100-r.p.m., 150-lb. pressure Bates Corliss Engine direct connected to 325-kw. D.C. generator, 550-volt Westinghouse, 100-r.p.m. with panel.

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BUCKEYE ENGINE AND GENERATOR

in good condition, description as follows:
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ENGINE—Mfg., Buckeye; Horla. Engine; Mfg. No. 5306 1/2; Generator on right; crank on left; Tandem; Diam. Cyl—12 H 20-L; Stroke 32 in.; Cyl.—not rebored; Shaft Diam.—(in wheel) 14 in.; (in armature) 14; Length—31 ft.; Wheel Diam.—11 ft.; Face 20; Sections 2; Exhaust 13 in.; Floor Space—16 1/2 x 31 ft. 3 in.; Diam. Steam 6 in.; Weight—not known.

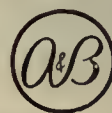
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 All filled with oil and in excellent shape.

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of this is the variety of this journal's Searchlight ads. Without a constant and appreciable demand for such machinery or services, by its readers, the market-place which these advertisements represent could not exist for any length of time.

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0200

Notice to Advertisers!

Owing to the holiday, July 4th, the "Searchlight" pages of the July 2d issue will close for press a day earlier than usual. Copy for this issue should therefore reach us by

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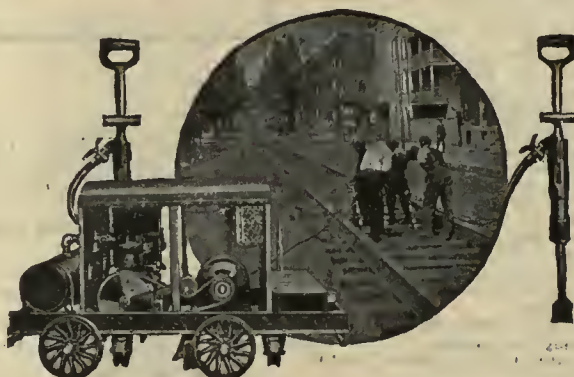
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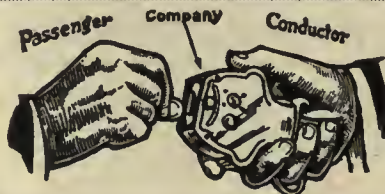
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Babcock & Wilcox Co.
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Power Specialty Co.

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Gold Car Heating & Lighting Co.
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Dayton Mechanical Tie Co.

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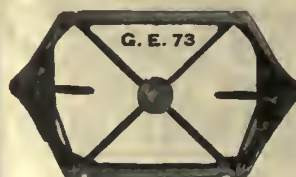
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